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# JOURNAL

OF THE

## ARNOLD ARBORETUM

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VOL. XXXIII

APRIL 1952

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### STUDIES OF PACIFIC ISLAND PLANTS, XI<sup>1</sup> FURTHER NOTES ON FIJIAN FLOWERING PLANTS

A. C. SMITH

THE PRESENT PAPER CONCLUDES from No. VII of this series (in Jour. Arnold Arb. 31: 288-319. 1950) a discussion of recently collected noteworthy plants of angiosperm families in Fiji; here are included the families from Rhizophoraceae to Compositae, in the Engler and Prantl sequence. The description of a new species of Theaceae, kindly contributed by Dr. C. E. Kobuski, is also here included. This paper completes the study of the specimens collected by the writer in 1947,<sup>2</sup> with the exception of a few families which are being studied more intensively and which will form the subject matter of further reports in this series. The place of deposit of cited specimens is indicated as follows: Arnold Arboretum (A); British Museum (BM); Gray Herbarium (GH); Royal Botanic Gardens, Kew (K); New York Botanical Garden (NY); and U. S. National Herbarium (US).

### THEACEAE

By C. E. KOBUSKI

*Eurya greenwoodii* Kobuski, sp. nov.

Frutex 2-3 m. altus; ramis ramulisque glabris, teretibus rubro-brunneis. Folia subcoriacea vel submembranacea, glabra (gemmis basi leviter pubescentibus), ovalia vel ovata, 3-4.5 cm. longa, 1.5-2 cm. lata, apice brevicauminata, leviter retusa, basi rotundata vel cuneata, margine plana basi conspicue revoluta, costa supra canaliculata subtus elevata, venis 7 vel 8

<sup>1</sup>No. X of this series was published as Vol. 30, Part 4, of Contributions from the U. S. National Herbarium (1952).

<sup>2</sup>Under the auspices of the Arnold Arboretum of Harvard University and the John Simon Guggenheim Memorial Foundation, with the aid of grants from the Penrose Fund of the American Philosophical Society and the Bache Fund of the National Academy of Sciences.



paribus ad marginem reticulatis, petiolis teretibus 3–4 mm. longis, glabris. Flores axillares, 2–5-fasciculati erecti vel nonnumquam cernui; ♂ : ignoti; ♀ : pedicellis teretibus 2–2.5 mm. longis, pubescentibus; bracteolis 2, oppositis, persistentibus, pubescentibus rotundatis vel subrotundatis circa 1 mm. longis et 1 mm. latis, apiculatis; sepalis 5, imbricatis, glabris, inaequalibus, 1.5–2 mm. longis, 2–2.5 mm. latis, concavis, margine scariosis; petalis 5, albis, late oblongis, 3.5–4 mm. longis, 2–2.5 mm. latis, apice leviter retusis, basi  $\frac{1}{2}$  connatis; staminodiis 0; ovario globoso, glabro 1.5–2 mm. diametro 4-loculato (raro 3-loculato), loculis multiovulatis; stylis 4, liberis, circiter 0.5 mm. longis, maturitate recurvatis. Fructus ignotus.

VITI LEVU: M b a : Immediate vicinity of Nandarivatu, alt. 800–900 m., June 26, 1947, *Smith 4898* (A TYPE, US) ("samu ni mbati"; compact shrub 2–3 m. high, in dry forest; petals white); same locality, *Greenwood 236A* (A) (much branched shrub to 3 m. high; flowers white), *Degener 14799* (A, US) (spreading shrub about 1 m. high, in scrub vegetation).

This species is most closely allied to *E. vitiensis* A. Gray, but can be separated from the latter by the smaller glabrous oval or ovate leaves (3–4 cm. long), and by the glabrous branchlets and terminal buds. In *E. vitiensis* the obovate leaves are longer, measuring up to 7.5 cm. long, and with pubescent petioles. The very young branchlets and terminal buds are also pubescent. The three cited specimens of the new species bear only pistillate flowers.

## RHIZOPHORACEAE

### *Crossostylis pedunculata* sp. nov.

Arbor gracilis ad 8 m. alta, ramulis validis, juvenilibus complanatis pilis circiter 0.3 mm. longis stramineis copiose pilosis mox glabrescentibus, internodiis 2–2.5 cm. longis; stipulis oblongo-lanceolatis circiter 13 mm. longis et 4 mm. latis dorso basim versus puberulis ceterum glabris caducis; petiolis rugulosis subteretibus 15–25 mm. longis ut ramulis decidue pilosis; laminis in sicco fuscis chartaceis ellipticis, 10–13 cm. longis, 5–8 cm. latis, basi obtusis et in petiolum longe decurrentibus, apice obtuse cuspidatis saepe obscure emarginatis, margine basim versus integris superne crenatis (crenaturis circiter 2 per centimetrum), praeter costam subtus ut petiolum pilosam utrinque glabris, costa supra subplana subtus prominente, nervis secundariis utrinsecus 8 vel 9 arcuato-patentibus utrinque leviter elevatis, rete venularum irregulari utrinque subprominulo vel immerso; inflorescentiis binis in axillis superpositis pedunculatis, pedunculo crasso subtereti 6–9 mm. longo ut petiolo breviter piloso; floribus ut videtur 2 per inflorescentiam primo involucro (bracteis connatis) ovoideo circiter 9 mm. longo parce piloso apice cuspidato unilateraliter fisso inclusis; pedicellis sub anthesi 6–9 mm. longis stramineo-hispidulis; calyce carnoso rotato-cupuliformi 8–10 mm. diametro extus parce strigilloso plerumque 5-lobato, lobis oblongo-deltoides circiter 4 mm. longis 2.5–3 mm. latis apice sub-

acutis et hispidulis; petalis mox caducis submembranaceis obovatis circiter 5 mm. longis et 2 mm. latis, basim versus angustatis, apice emarginatis et inconspicue glanduloso-erosulis, praeter lineam medianam dorsalem hispidulam glabris; disco carnosio perigyno margine libero et obscure hispidulo; staminibus plerumque 20, filamentis gracilibus teretibus glabris 2–2.5 mm. longis, antheris oblongis circiter 0.8 mm. longis; ovario subcomplanato faciei superiore copiose sed minute hispidulo, stylo crasso circiter 1.5 mm. longo glabro apice radiatim plurilobato, lobis reflexis filiformibus stigmatosis plus minusve coadnatis.

VANUA LEVU: Thakaundrove: Natewa Bay region, hills west of Korotasere, alt. 100–300 m., June 8, 1934, *Smith 1925* (GH, NY, US 1676416 TYPE, etc.) (slender tree 8 m. high, in forest; calyx-lobes and filaments white).

The collection described above was originally identified by me as *C. seemanni* (A. Gray) Schimp., and as such duplicates were distributed. However, it clearly differs from *C. seemanni* in its less copiously pubescent young parts and its glabrous stipules and leaf-blades, by having its flowers borne at the apex of short stout peduncles, and in its larger flowers, which furthermore have the sepals and petals only sparsely pilose and the filaments comparatively long. In foliage the new species is suggestive of *C. biflora* Forst., of the Society Islands (whether or not this includes the Samoan form discussed by A. Gray, Bot. U. S. Expl. Exped. 1: 610. *pl.* 77. 1854, and Christophersen, in Bishop Mus. Bull. 128: 155. 1935), and *C. banksiana* Guillaumin, from the New Hebrides. From these, however, *C. pedunculata* differs in the pubescence of its young parts and flowers. It further differs from *C. biflora* in its smaller flowers, with shorter filaments and style and without staminodes or disk-lobes. *Crossostylis banksiana* appears to have flowers smaller than those of *C. pedunculata* and petals pilose within, but it is perhaps the closest ally of the new species.

### *Crossostylis pachyantha* sp. nov.

Arbor parva ubique praeter flores glabra, ramulis subteretibus (juvenilibus subquadrangularibus); stipulis in sicco subcoriaceis lanceolatis 10–15 mm. longis; petiolis gracilibus 10–17 mm. longis margine leviter angulatis; laminis in sicco coriaceis fuscis elliptico-obovatis, 8–12 cm. longis, 3–5 cm. latis, basi attenuatis et in petiolum longe decurrentibus, apice rotundatis vel obscure emarginatis vel obtusis, margine integris, costa supra in sulculam elevata subtus prominente, nervis secundariis utrinsecus 7–9 erecto-patentibus marginem versus curvatis et anastomosantibus supra subplanis subtus leviter elevatis, rete venularum immerso vel subtus laxo subprominulo; inflorescentiis apices ramulorum versus axillaribus breviter pedunculatis, pedunculo crasso haud 3 mm. longo apice ut videtur flores circiter 4 gerente, bracteis non visis; pedicellis validis glabris sub anthesi 5–8 mm. longis in sicco superne leviter angulatis, floribus apice circiter 7–8 mm. diametro; calyce crasso-carnoso rotato-cupuliformi extus glabro, lobis plerumque 5 interdum 4 oblongo-deltaideis 3–4 mm. longis 2–3 mm. latis apice subacutis intus pilis 0.1–0.2 mm. longis fulvis dense sericeo-



tomentellis; petalis mox caducis carnosis valde carinatis obovatis circiter 3.5 mm. longis et 2 mm. latis, basi valde angustatis, apice emarginatis, utrinque basim et medium versus puberulis; disco carnosio perigyno glabro margine haud libero; staminibus 21–26, filamentis crassis 0.5–0.7 mm. longis glabris, antheris oblongis circiter 0.7 mm. longis; gynoezio glabro, ovario subcomplanato sub anthesi ad 3 mm. diametro inconspicue 10–12-lobato, ovulis numerosis (ut videtur 20–24) geminatim radiatis; stylo crasso (ad 1 mm. diametro) tereti circiter 1.5 mm. longo apice radiatim plurilobato, lobis filiformibus stigmatosis in peltam carnosam ad 2 mm. diametro coadnatis.

VITI LEVU: Naitasiri: Near Tholo-i-suva, alt. about 200 m., Feb. 23, 1947, *J. H. Vaughan 3370* (BM TYPE) (small tree, with dark, shiny foliage and green flowers); Nasinu, *Gillespie 3650* (GH).

In general appearance and leaf-shape, the species here described could be taken for a form of *C. richii* (A. Gray) A. C. Sm., although it is more robust in vegetative parts than any available specimens of *C. richii*, which now appears to be the most abundant species of the genus in Fiji. In inflorescence characters, however, the two species are quite different, *C. pachyantha* being at once distinguished by the thick texture of its much larger calyx, the dense indument of the inner surface of calyx-lobes, the numerous stamens and ovules, the glabrous ovary with 10–12 radiating sulcae, and the stout style with numerous stigmatic branches.

## COMBRETACEAE

***Terminalia vitiensis*** A. C. Sm. in *Sargentia* 1: 74. 1942.

VANUA LEVU: Mathuata: Southern slopes of Mt. Numbuiloa, east of Lambasa, alt. 350–500 m., *Smith 6441* (A, US) (tree 5 m. high, in thin forest on rocky slope; calyx, filaments, and style pale yellowish green).

The cited specimen, the second known of the species, agrees excellently with the type, from the Province of Serua on Viti Levu. The only points of difference are minor; the Mathuata specimen has the leaf-blades rarely larger, up to  $10 \times 4.5$  cm., the rachis and pedicels sparsely pilose rather than glabrous, the pedicels longer (up to 7 mm. long), and the filaments and style up to 15 mm. in length.

***Terminalia luteola*** sp. nov.

Arbor multiramosa ad 8 m. alta, partibus novellis pilis aureis 0.6–1 mm. longis copiose hispidulo-sericeis, ramulis infra folia apice congesta copiose cicatricosis glabris demum cinereis apicem versus ad 8 mm. diametro; petiolis semiteretibus 0.7–2 cm. longis ut ramulis juvenilibus copiose patentipilosis, laminis chartaceis siccitate fusco-olivaceis late obovatis, 8–12 cm. longis, 5–8 cm. latis, basi obtusis in petiolum breviter decurrentibus, apice rotundatis vel leviter emarginatis, margine integris, utrinque ut petiolo subpersistententer pilosis (pilis pallidis costa nervisque magis copiosis), costa supra paullo subtus valde elevata, nervis lateralibus utrinsecus 8–10

erecto-patentibus marginem versus curvatis utrinque elevatis, rete venularum laxo utrinque prominulo; inflorescentiis axillaribus spicatis sub anthesi 6–11 cm. longis, pedunculo ad 3 cm. longo et rhachi gracilibus pilis mollis 0.3–0.6 mm. longis copiose tomentellis; floribus numerosis congestis sessilibus bracteolatis, bracteolis reflexis oblongo-linearibus 3–5 mm. longis utrinque copiose tomentellis; calyce infundibuliformi 6–8 mm. longo extus pilis 0.3–0.4 mm. longis copiose et molliter tomentello, tubo 2–3.5 mm. longo 2–2.5 mm. diametro basi truncato, limbo tenuiter carnosus 4–5 mm. longo intus pilis 1–1.3 mm. longis pallidis sericeo, lobis deltoideo-lanceolatis circiter 2 mm. longis acutis; lobis disci 5 carnosius copiose hispidulis; staminibus 8–11, filamentis filiformibus sub anthesi 7–9 mm. longis glabris superne angustatis, antheris oblongo-ellipsoideis circiter 1 mm. longis, loculis ad medium liberis; stylo in floribus ♀ tereti carnosus 8–11 mm. longo glabro superne contracto, in floribus ♂ rudimentario; ovulis 2 a funiculis gracilibus pendulis.

VANUA LEVU: Mathuata: Southern slopes of Mt. Numbuloa, east of Lambasa, alt. 350–500 m., Oct. 29, 1947, *Smith 6409* (A TYPE, US) (tree 8 m. high, in transitional zone between reed-covered slopes and forest; filaments and style yellowish green; anthers yellow).

Although the new species was collected in the same locality as *T. vitiensis* A. C. Sm., noted above, it is not closely related to that species, being immediately distinguished by its dense indument, larger leaves, sessile flowers, etc. *Terminalia litoralis* Seem. has leaves somewhat resembling in shape those of the new species, but they are glabrous or essentially so and the inflorescence is also glabrous and has small pedicellate flowers.

## MELASTOMATACEAE

### *Medinilla subviridis* sp. nov.

Frutex scandens, partibus novellis et ramulorum apicibus copiosissime tomentosis, pilis pallide ferrugineis 1–2 mm. longis multicellularibus lateraliter brevi-calcaratis, ramulis elongatis gracilibus teretibus vel superne inconspicue sulcatis mox glabratis cinerascentibus, internodiis 2–4 cm. longis; foliis valde disparibus minoribus mox caducis; foliis majoribus: petiolis leviter canaliculatis 5–15 mm. longis ut ramulis juvenilibus tomentosis demum glabratis, laminis chartaceis in sicco fusco-olivaceis oblongo-ellipticis, 10–15 cm. longis, 3.5–7 cm. latis, basi obtusis vel rotundatis raro subattenuatis vel leviter cordatis, apice obtusis vel breviter cuspidatis (apice ipso haud 1 cm. longo), 5- vel 7-nerviis, nervis superioribus cum costa ad 1–2 cm. conjunctis supra planis vel interdum leviter sulcatis subtus valde elevatis, nervis aliis debilioribus, venulis transversis subtus prominulis aliis immersis, primo ut ramulis pilosis demum supra glabratis subtus certe nervis subpersistentibus tomentellis; foliis minoribus: petiolis subnullis, laminis suborbicularibus vel



ellipticis, 1–2.5 cm. longis latisque, basi rotundatis saepe amplexicaulibus, apice rotundatis vel obtusis, inconspicue 3- vel 5-nerviis, demum glabratiss; inflorescentiis axillaribus vel e ramulis infra folia orientibus solitariis cymoso-racemosis, 2–5 cm. longis paucifloris (floribus in verticillis 1–3 dispositis); pedunculo brevi (haud 1 cm. longo) et rhachi teretibus gracilibus pilis pallide brunneis circiter 1 mm. longis copiose tomentosis demum subglabratiss; bracteis 3 vel 4 e nodis papyraceis oblongis, 3–7 mm. longis, 1.5–3 mm. latis, basi et apice obtusis, primo ut rhachi pilosis demum glabratiss; floribus 3 vel 4 e nodis, pedicellis gracilibus 3–5 mm. longis sub anthesi ut rhachi copiose pilosis; bracteolis apice pedicellorum binis florem obtegentibus submembranaceis deltoideo-ovatis, 12–20 mm. longis, 9–15 mm. latis, basi et apice rotundatis, utrinque molliter pilosis (pilis patentibus 0.3–0.7 mm. longis breviter calcaratis) demum subglabratiss; calyce sub anthesi circiter 5 mm. longo et apice diametro carnosio, tubo cupuliformi 2.5–3 mm. longo basi rotundato et supra bracteolas minute stipitato ut bracteolis dense tomentoso (pilis ad 1 mm. longis), limbo suberecto membranaceo subintegro vel minute 4-dentato; petalis 4 membranaceis glabris oblongo-obovatis, 7.5–8.5 mm. longis, 6–7 mm. latis, basi angustatis, apice rotundatis et paullo retusis, obscure nervatis; staminibus 8, filamentis gracilibus glabris circiter 3 mm. longis, antheris oblongis 1.7–2 mm. longis, basi trilobulatis (lobis 2 anterioribus haud projectis, lobo posteriore circiter 0.4 mm. diametro), apice obtusis, poris confluentibus; stylo carnosio tereti circiter 5 mm. longo, stigmatе minuto; fructibus subglobosis demum glabratiss, calycis limbo persistente, pericarpio tenui, seminibus numerosis.

VITI LEVU: Naitasiri: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi [Mt. Victoria] and Nasonggo, alt. 870–970 m., Sept. 18, 1947, *Smith 6112* (A TYPE, US) (liana, in dense forest; bracts and bracteoles pale greenish white or very faintly pink-tinged; calyx white with pale brown pubescence; petals, filaments, and style pure white; anthers rich blue with bright yellow basal lobes; fruit rich purple); same locality, Aug. 21, 1947, *Smith 5793* (A, US) (high-climbing liana, in dense forest; bracts and bracteoles thin, very pale green, with brown puberulence; calyx white, similarly puberulent; corolla pure white; filaments and style white; anthers rich purple with bright yellow basal lobes; young fruit white to pale green, then blue-tinged).

The species here described, observed at only one locality, in central Viti Levu, is without close relatives, at least in Fiji and the adjacent archipelagos. In general type of indument and in bracteole-size the new species approaches *M. longicymosa* Gibbs, but differences in foliage, length of trichomes, color of inflorescence-parts, size and shape of bracts, shape of bracteoles, and dimensions of petals and stamens are so great that comparison of the two species is superfluous. A closer ally of *M. subviridis* may be *M. rhodochlaena* A. Gray, which suggests it in leaf-shape, type of trichomes, proportions of bracts and bracteoles, and flower-size, but *M. rhodochlaena* has rich pink bracts and bracteoles, the latter being only 4–11 mm. in diameter.



**Astronidium degeneri** A. C. Sm. in *Sargentia* 1: 93. 1942.

VITI LEVU: Mba: Northern portion of Mt. Evans Range, between Mt. Vatuyanitu and Mt. Natondra, alt. 700–900 m., *Smith* 4359 (A, US) (tree 13 m. high, on edge of forest); mountains near Lautoka, alt. about 550 m., *Greenwood* 931 (A).

The second and third known collections of this species agree very closely with the type, which was obtained at lower elevation near the south coast of Viti Levu.

## ARALIACEAE

**Plerandra pickeringii** A. Gray, Bot. U. S. Expl. Exped. 1: 729. *pl* 95. 1854.

This striking species is the common *sole* or *sole ndina* (i. e. the true *sole*) of the Fijians. It is readily recognized by its very large leaves (with petioles up to 1 meter long, the 9–12 leaflets up to  $40 \times 18$  cm. or more) and robust compound umbels (with 10–15 rays, each as much as 30 cm. long and with 30–60 flowers). Gray's original description of the staminate flowers is more or less correct, except for the reference to "stamens . . . as many as 60 or 70." Actually the stamens, in both staminate and perfect flowers, are between 200 and 300, crowded in 5–7 series; the type specimen (*U. S. Expl. Exped.*, US 62359) also bears this out. In both staminate and perfect flowers the ovary seems well developed, with 13–16 locules, but in the former case the ovules are abortive and the stylopodium is inconspicuous, truncate, and depressed at the center; in perfect flowers the stylopodium is elongate (up to 1 cm. long in fully developed fruits) and composed of styles firmly connate to the apex. Among my recent collections the species is represented by nos. 4021 and 5803 (staminate flowers) and 6896 (perfect flowers and fruits). I do not find that this species has the petals connate into a calyptra, a character emphasized by Seemann (*Fl. Vit.* 117. 1865); in most specimens the petals tend to separate before falling, but I do not believe the degree of coherence to be a reliable character.

**Plerandra insolita** sp. nov.

Arbor gracilis ad 9 m. alta pauciramosa ubique glabra, ramulis crassis teretibus fistulosis, foliis apices ramulorum versus aggregatis magnis; petiolis crassis subteretibus interdum copiose verrucoso-lenticellatis 40–50 cm. longis, basi in vaginam coriaceam 2–4 cm. latam dilatatis, ligula oblonga 1.5–2 cm. longa; foliolis 7–12 (plerumque 9–11), petiolulis crassis semiteretibus vel leviter canaliculatis 3.5–5.5 cm. longis, laminis in sicco subcoriaceis et fusco-olivaceis oblongo- vel anguste obovato-ellipticis, 20–35 cm. longis, 5–9 cm. latis, basi acutis vel attenuatis, apice obtusis vel rotundatis, margine integris et anguste recurvatis, costa valida utrinque prominente, nervis secundariis utrinsecus 15–25 erecto-patentibus curvatis utrinque elevatis, rete venularum immerso vel subtus prominulo;

inflorescentia pro genere compacta e ramulis infra folia oriente compositopseudoumbellata, radiis 5-7 (4-7 cm. longis) apice pedunculi brevis (1-5 cm. longi) dispositis, pedunculo et radiis inflorescentiae crassis (saepe 1 cm. diametro) conspicue verrucosis vel lenticellatis, radiis infra apicem incrassatis et ibi fructiferis vel copiose cicatricosis apice vel in centimetrum distale floriferis, umbellulis sub anthesi circiter 5 cm. diametro, floribus circiter 15-20 (♂ solis visis) bracteis subtentis, bracteis subcoriaceis oblongis ad  $15 \times 7$  mm. apice rotundatis scarioso-marginatis longe persistentibus; floribus ♂ sub anthesi subsessilibus vel pedicellis (paullo post anthesin) ad 12 mm. longis crassis; calyce sub anthesi 7-9 mm. longo obconico-cupuliformi, tubo tereti vel leviter angulato, limbo subcoriaceo erecto-patente lobis 5 vel 6 late deltoideis circiter 1 mm. longis obtusis inclusis circiter 2 mm. longo; petalis 5 vel 6 (raro 4) in calyptram conicam subacutam videtur subconnatis crasso-carnosis deltoideis, 7-8 mm. longis, 4-6 mm. latis, apice valde incrassatis et subacutis; staminibus numerosis (circiter 75) disco carnoso annulari 2- vel 3-seriatis, filamentis paullo ante anthesin ligulatis superne angustatis gracilibus 2-3.5 mm. longis, antheris oblongis 2-2.5 mm. longis utroque obtusis; stylopodio breviter conico vel umbonato obtuso carnoso 4-5 mm. diametro margine lobato sulculis 9-12 radiatis ornato; ovario sterili 7-8 mm. diametro, muro valde incrassato fistulis numerosis longitudinalibus copiose notato, loculis 9-12 magnis, ovulis nullis vel sterilibus; fructibus e radiis inflorescentiae 2-3 cm. infra apicem enatis, pedicellis sub fructu crassis ad 15 mm. longis, fructibus coriaceis obovoideo-ellipsoideis ad 2.5 cm. longis et 1.8 cm. diametro conspicue 9-12-sulcatis, calycis limbo persistente et stylopodio coronatis, stylopodio oblongo-umbraculiformi circiter 1 mm. longo et 3 mm. diametro, stylis firme connatis apice radiatis sed haud liberis, pyrenis 9-12 coriaceis falcato-obovoideis valde complanatis ad 20 mm. longis et 7 mm. latis, semine forma simili circiter  $13 \times 5$  mm.

VITI LEVU: M b a : Southern slopes of Mt. Ndelainathovu, on the escarpment west of Nandarivatu, alt. 870-970 m., June 26, 1947, *Smith 4922* (A TYPE, US) ("sole lailai"; slender tree 3-4 m. high, in dense forest; leaves terminal, with 9-11 leaflets; inflorescence arising just below leaves, composed of 5-7 umbels; petals deep purple without, pale green within; filaments white; anthers yellow; fruit black); S e r u a : Mbuyombuyo, near Namboutini, *Tabualewa 15584* (A, US, etc.) ("sole"; sparingly branched tree 9 m. high, in forest); Vatuivilakia, vicinity of Ngaloa, alt. 0-150 m., *Degener 15172* (A, US, etc.) ("sole"; unbranched tree 1-2 m. high, in open forest; petals purplish black without, greenish within).

The species described above is readily distinguished from the other Fijian *Plerandrae* by its compact inflorescence, of which the rays are not strictly umbelliform, the flowers being crowded upon the distal portion of each ray instead of arising from its actual apex. The three available collections are essentially identical in floral characters, all the available flowers being staminate. Fruits are borne from a swollen portion of the inflorescence-ray somewhat below the apex, indicating the polygamo-



monoecious character of the species; other species of the genus, in my observation, are polygamo-dioecious. In its large number of ovary-locules *P. insolita* suggests *P. pickeringii* A. Gray and *P. grayi* Seem., from both of which it differs in the characters mentioned above, the short-pedicellate and comparatively small flowers, the very thick ovary-walls traversed by copious longitudinal canals, etc.

## EPACRIDACEAE

*Leucopogon cymbulae* Labill. Sert. Austro-Caled. 36. *pl.* 39. 1824; Seem. in Bonplandia 10: 36. 1862, Fl. Vit. 147. 1866; Guillaumin in Bull. Soc. Bot. Fr. 74: 699. 1927, in Jour. Arnold Arb. 13: 11. 1932, in Bull. Soc. Bot. Fr. 82: 350. 1935.

*Leucopogon vitiensis* A. Gray ex Seem. in Bonplandia 10: 36, nomen. 1862.

VITI LEVU: M b a : Upper slopes of Mt. Koromba [Pickering Peak], alt. 800–1075 m., *Smith* 4700 (A, US) (tree 5 m. high, on forested crest; fruit orange). KANDAVU: *Seemann* 285 (GH). VANUA LEVU: M b u a : *H. B. R. Parham*, Jan. 7, 1937 (BM); M a t h u a t a : Wainikoro, *Greenwood* 703 (A) (shrub about 3 m. high, on dry open hillsides; flowers white; fruit yellow and finally red); between Ndreketi and Nasorowangga, *B. E. Parham* 1094 (A); Seanggangga Plateau, in drainage of Korovuli River, vicinity of Natua, alt. 100–200 m., *Smith* 6667 (A, US) (“seruserumasala”; shrub or tree 2–4 m. high, frequent in open rolling country; corolla white; fruit dull orange; wood used in making small hand-drums); summit ridge of Mt. Numbuiloa, east of Lambasa, alt. 500–590 m., *Smith* 6493 (A, US) (tree 3–5 m. high, in dense forest, locally abundant; corolla white; fruit at length orange). Fiji, without definite locality: *U. S. Expl. Exped.* (GH, US, source of the name *L. vitiensis*), *Horne* 654 (GH), *H. B. R. Parham* 14 (A).

The only previously published records of the occurrence of this genus in Fiji appear to be those of Seemann, cited above; Guillaumin has reported it from several islands in the New Hebrides, and it is frequently mentioned in literature pertaining to New Caledonia, the type locality. In the sense of Brongniart & Gris (in Ann. Sci. Nat. Bot. V. 2: 153. 1864), *L. cymbulae* is a variable species in New Caledonia. In general, the material from Fiji and the New Hebrides has the leaves longer and proportionately narrower than that from New Caledonia, but I find no inflorescence differences of note. Possibly the Fijian and New Hebrides specimens should receive varietal recognition, but at present this seems inadvisable and I am willing to follow Seemann and Guillaumin in their identifications.

As the above citations show, the species is rare in Fiji except in northern Vanua Levu; in Mathuata it is a very frequent component of the “talasinga” vegetation, but curiously there appear to be no collections of it from the similar zone of northern and western Viti Levu. The cited specimen from Mt. Koromba was obtained in a forested highland which interrupts the “talasinga” of western Viti Levu.

## MYRSINACEAE

***Maesa stenophylla* sp. nov.**

Frutex ad 4 m. altus ubique glaber, ramulis gracilibus teretibus fuscis lenticellis pallidis copiose verrucosis; petiolis gracilibus canaliculatis 8–12 mm. longis, foliorum laminis papyraceis siccitate fusco-viridibus lanceolatis, 7–12 cm. longis, 1.7–2.5 cm. latis, basi attenuatis et in petiolum decurrentibus, apice obtusis, margine integris vel undulatis et anguste revolutis, costa supra elevata subtus prominente, nervis lateralibus utrinsecus 4–6 valde adscendentibus elongatis supra planis vel prominulis subtus leviter elevatis, lineis nervilliformibus numerosis irregularibus subtus manifestis supra obscuris; inflorescentiis axillaribus racemosis vel anguste paniculatis sub anthesi 2.5–4 cm. longis, pedunculo subnullo et rhachi gracilibus, bracteis lanceolatis acutis 0.5–1 mm. longis, pedicellis gracilibus 1.5–2 mm. longis; floribus 5-meris circiter 2 mm. longis et apice 2.5 mm. diametro; prophyllis liberis deltoideo-lanceolatis 0.5–0.8 mm. longis dorso parce lepidotis; calyce circiter 1.5 mm. longo, tubo obconico minute lepidoto, lobis deltoideis circiter 0.7 mm. longis subacutis non glanduloso-lineatis; corolla campanulata circiter 1.5 mm. longa inconspicue glanduloso-lineolata, lobis ovatis circiter 0.9 mm. longis latisque apice rotundatis margine erosulis; staminibus basim corollae versus insertis, filamentis gracilibus 0.1–0.2 mm. longis, antheris deltoideo-ovoideis 0.3–0.4 mm. longis; ovario levi semigloboso-conico, stylo brevi crasso tereti 0.2–0.3 mm. longo, stigmate obscure bilobato, ovulis circiter 10 biseriatis; fructibus immaturis ovoideo-ellipsoideis inconspicue luteo-glanduloso-lineolatis circiter 2.5 mm. diametro, calycis lobis et stigmatibus persistentibus.

VANUA LEVU: Mathuata: Northwestern slopes of Mt. Numbuloa, east of Lambasa, alt. 350 m., Nov. 6, 1947, *Smith 6490* (A TYPE US) ("kolonimbeka"; shrub 4 m. high, locally frequent in hillside thickets; corolla pale yellow with salmon-pink markings; filaments pale green; anthers yellow).

From its closest ally, *M. persicaefolia* A. Gray, the new species differs in its narrower leaves with sharply ascending secondaries, its simpler and less obviously lepidote inflorescence, and its slightly larger flowers with less prominent glandular markings. *Maesa neriifolia* Gillespie seems very close to *M. persicaefolia* but has even more conspicuously glandular-lineolate floral parts.

***Tapeinosperma chloranthum* sp. nov.**

Arbor ad 12 m. alta inflorescentiis exceptis glabra, partibus novellis minute puberulis mox glabratiss, ramulis cinereis plerumque teretibus ad nodos incrassatis robustis superne cicatricosis, ramulis foliiferis saepe gracilibus; petiolis sat robustis semiteretibus 10–15 mm. longis, laminis chartaceis in sicco fusco-viridibus immerso-glandulosis anguste oblongo-ellipticis, 10–20 cm. longis, 4–7.5 cm. latis, basi in petiolum attenuatis et longe decurrentibus, apice obtusis vel anguste rotundatis, margine integris



anguste recurvatis, costa valida supra subplana subtus prominente, nervis lateralibus primariis utrinsecus circiter 18–22 patentibus utrinque cum rete venularum prominulis; inflorescentiis apices ramulorum versus axillaribus paniculatis sub anthesi ad 6 cm. longis latisque, pedunculo brevi et rhachi ramulisque validis subteretibus copiose tomentellis (pilis cinnamomeis 0.2–0.4 mm. longis multicellularibus saepe irregulariter ramulosis eglandulosis), bracteis oblongis 2–3 mm. longis subacutis intus glabris; pedicellis crassis teretibus 2.5–5 mm. longis ut inflorescentiae ramulis cum calyce dense tomentellis superne incrassatis; calyce cupuliformi 3.5–4.5 mm. longo et apice circiter 5 mm. diametro textura subcarnoso immerso-nigro-glanduloso intus glabro profunde lobato, lobis 5 (raro 6) ovatis subacutis circiter 2 mm. longis latisque; corolla crasso-carnosa infundibulari-rotata sub anthesi circiter 6 mm. longa et apice diametro, tubo 1–2 mm. longo, lobis 5 immerso-nigro-glandulosis late imbricatis ovatis circiter  $4 \times 3$  mm. obtusis; staminibus corollae faucibus insertis, filamentis carnis ad 0.4 mm. longis, antheris deltoideo-ovoideis circiter 1.2 mm. longis obtusis dorso glandulis inconspicuis ornatis; gynoecio sub anthesi circiter 3 mm. longo, ovario ovoideo minutissime et pallide glanduloso-puberulo in stylum gracilem attenuato, stigmate subpeltato circiter 0.5 mm. diametro, placenta ovoidea apice subacuta, ovulis 3; inflorescentiis sub fructu majoribus ad 20 cm. longis, pedunculo ad 3.5 cm. longo et ramulis pedicellisque subpersistenter tomentellis, pedicellis superne valde incrassatis, calyce demum rotato ad 7 mm. diametro extus persistenter tomentello; fructibus subglobosis ad 7 mm. diametro stylo coronatis, pericarpio coriaceo circiter 1 mm. crasso glandulis magnis atris ovalibus copiose ornato, semine 1 subgloboso.

VITI LEVU: M b a : Hills between Nggaliwana and Nandala Creeks, south of Nauwanga, alt. 725–850 m., Aug. 26, 1947, *Smith 5820* (A TYPE, US) (tree 10 m. high, in dense forest; calyx brown; corolla dull green with purplish glands; mature fruit red); slopes of Mt. Nairoso, eastern flank of Mt. Evans Range, alt. 700–1050 m., *Smith 4023* ("kutumirase"; tree 12 m. high, in dense forest); eastern slopes of Mt. Koroyanitu, Mt. Evans Range, alt. 950–1050 m., *Smith 4133* (A, US) (tree 10 m. high, in dense low forest).

From its closest ally, *T. clavatum* Mez, the new species is readily distinguished by the much more copious and persistent indument of its inflorescence-branches and calyces and by its larger flowers with thick-carnose infundibuliform corollas. *Tapeinosperma greenwoodii* A. C. Sm., known only from the Mt. Evans Range, where the new species also occurs, has similar foliage but a more delicate and small-flowered inflorescence, the indument being composed of very minute (less than 0.1 mm. long) simple glandular hairs.

### *Tapeinosperma ligulifolium* sp. nov.

Frutex ad 2 m. altus partibus novellis et inflorescentiis glanduloso-puberulis exceptis ubique glaber, ramulis cinereis teretibus subvalidis; foliis apices ramulorum versus confertis, petiolis crassis rugulosis 2–5 mm.

longis, laminis in sicco coriaceis olivaceis elongato-ligulatis, 20–32 cm. longis, 1–1.5 cm. latis, basi obtusis, apice obtusis vel anguste rotundatis, margine integris plerumque valde revolutis, utrinque inconspicue glandulosis, costa supra valde impressa subtus prominente, nervis lateralibus primariis numerosis circiter 1 cm. distantibus brevibus patentibus intra marginem anastomosantibus cum rete venularum inconspicue prominulis; inflorescentia (unica visa) prope apicem ramuli axillari gracili multiflora anguste paniculata circiter 12 cm. longa et 6 cm. lata, pedunculo circiter 5 cm. longo et rhachi ramulisque gracilibus subteretibus pilis haud 0.1 mm. longis parce glanduloso-puberulis, bracteis oblongo-ligulatis 1–1.5 mm. longis obtusis extus glandulosis intus glabris; pedicellis sub anthesi 2–3 mm. longis ut inflorescentiae ramulis cum calyce glandulosis; calyce rotato circiter 3 mm. diametro intus glabro profunde 5-lobato, lobis lanceolatis 1–1.2 mm. longis et circiter 0.7 mm. latis subacutis minute glanduloso-ciliolatis; corolla tenuiter carnosa paullo ante anthesin circiter 3.5 mm. diametro glanduloso-punctata, lobis 5 fere ad basim liberis ovatis circiter 2.5 mm. longis latisque apice obtusis; staminibus prope basim corollae insertis, filamentis circiter 0.5 mm. longis, antheris oblongo-deltaideis circiter 1.2 mm. longis acutis obscure glandulosis; gynoeceo sub anthesi circiter 2 mm. longo, ovario oblongo minute glanduloso in stylum crassum attenuato, stigmatibus minute subpeltatis, ovulis ut videtur 2.

VANUA LEVU: Mathuata: Summit ridge of Mt. Numbulua, east of Lam-basa, alt. 500–590 m., Nov. 6, 1947, *Smith 6522* (A TYPE) (shrub 2 m. high, in dense forest; inflorescence-branches and perianth-parts rich pink).

This extraordinarily distinct species, represented by a single though reasonably ample specimen, is at once distinguished by its remarkably long and narrow leaf-blades, which are conspicuously revolute and essentially sessile; its inflorescence is comparatively delicate, with slender pedicels and narrow calyx-lobes. The relationship of *T. ligulifolium* is probably with such species as *T. grande* (Seem.) Mez and *T. megaphyllum* (Hemsl.) Mez, both with large narrow leaves, which, however, do not approach in proportions those of the new species.

### **Discocalyx oblecta** sp. nov.

Arbor vel frutex ad 6 m. altus, partibus novellis copiose ferrugineo-puberulis, ramulis teretibus gracilibus cinereis mox glabris ad nodos incrassatis; petiolis subvalidis supra canaliculatis ad 1 cm. longis saepe fere ad basim anguste alatis mox glabris; laminis foliorum in sicco chartaceo-subcoriaceis fuscis oblanceolatis, (5–) 7–12 cm. longis, (2–) 3–4.5 cm. latis, basi attenuatis et in petiolum longe decurrentibus, apice obtusis, margine integris et leviter recurvatis, supra glabris, subtus copiose glanduloso-punctatis et costa saepe pilosis, costa valida supra subplana vel elevata subtus prominente, nervis lateralibus utrinsecus circiter 8–10 erecto-patentibus subtus prominulis vel interdum utrinque immersis, rete venularum subimmerso; inflorescentiis apices ramulorum versus axillaribus amplis paniculatis 6–11 cm. longis multifloris, pedunculo (ad 3.5 cm. longo)



rhachi ramulisque subteretibus striatis copiose puberulis (pilis brunneo-ferrugineis glandulosis) demum subglabratis, bracteis oblongo-lanceolatis 2–3 mm. longis caducis, bracteolis minoribus; floribus paullo ante anthesin subsessilibus (pedicello ad 1 mm. longo), calyce et pedicello pilis brunneo-ferrugineis ad 0.1–0.2 mm. longis densissime glanduloso-tomentello-puberulis; calyce obconico-pyriformi circiter 2.5 mm. longo et diametro intus glabro, lobis 5 ovatis 1–1.3 mm. longis latisque acutis ciliis circiter 0.3 mm. longis copiose ornatis; corolla carnosa submatura videtur rotata 3–3.5 mm. diametro profunde 5-lobata, lobis oblongis circiter 1.5 mm. longis apice rotundatis immerso-glandulosis dorso parce pilosis alibi glabris; staminibus immaturis, filamentis gracilibus haud 0.1 mm. longis, antheris deltoideo-oblongis circiter 0.5 mm. longis apice obtusis; gynoeceo glabro in stylum gracilem circiter 0.6 mm. longum et stigmatem parvum peltatum attenuato, ovulis ut videtur paucis; calyce sub fructu rotato circiter 3 mm. diametro persistenter ciliolato et saltem inconspicue glanduloso-tomentello, fructu subgloboso 5–6 mm. diametro stylo minuto coronato.

VITI LEVU: M b a : Hills east of Nandala Creek, about 3 miles south of Nandarivatu, alt. 870–970 m., Sept. 25, 1947, *Smith 6217* (A TYPE, US) (tree 4 m. high, in dense forest; flower-buds brown); hills between Nggaliwana and Tumbendreketi Creeks, east of the sawmill at Navai, alt. 725–800 m., *Smith 6007* (A, US) (tree 6 m. high, in dense forest; young flowers cinnamon-brown); southern slope of Mt. Ndelainathovu, on the escarpment west of Nandarivatu, alt. 870–970 m., *Smith 4921* (A, US) (“sila”; simple-stemmed shrub 2 m. high, in dense forest; fruit red, at length purplish); Mt. Evans Range, alt. about 970 m., *Greenwood 1149* (A) (tree 5–6 m. high, in dense forest; flower-buds brown).

Of the four available collections, my no. 4921 bears fruits and the others immature flowers. The species is readily distinguished by the close and copious glandular-tomentellous indument of the inflorescence-branches and calyces. Among the described Fijian species, only *D. divaricata* Gillespie has an obviously pilose inflorescence, and from that the new species differs in its short petioles, its thick obovate leaf-blades narrowed at base, and its flowers with shorter pedicels and pyriform calyces. *Discocalyx divaricata*, a very graceful and attractive species, is quite frequent in upland Viti Levu, being represented by my nos. 4250, 4526, 4823, and 6216. In foliage *D. obtecta* more nearly resembles *D. fusca* Gibbs, but that species is essentially glabrous throughout.

### ***Discocalyx gillespieana* sp. nov.**

Arbor gracilis ad 4 m. alta partibus novellis et inflorescentiis obscure glanduloso-puberulis exceptis ubique glabra, ramulis teretibus gracilibus fuscis ad nodos incrassatis; petiolis semiteretibus rugulosis 10–17 mm. longis, laminis foliorum in sicco subcoriaceis fusco-olivaceis elliptico-obovatis, 7–11.5 cm. longis, 3–4.5 cm. latis, basi acutis et in petiolum decurrentibus, apice rotundatis vel late obtusis, margine integris anguste recurvatis, subtus parce glanduloso-punctatis, costa supra subplana subtus prominente, nervis lateralibus utrinsecus 10–12 subpateentibus utrinque

prominulis vel interdum cum rete venularum obscuris; inflorescentiis apices ramulorum versus congestis compacte paniculatis ad 3.5 cm. longis latisque, pedunculo brevi rhachi ramulisque paucis gracilibus teretibus parce glanduloso-puberulis mox glabratis, bracteis oblongo-lanceolatis circiter 2 mm. longis caducis; pedicellis gracilibus sub anthesi 1.5–2 mm. longis subglabris; calyce rotato sub anthesi 2–2.5 mm. diametro extus obscure glanduloso-puberulo, lobis 5 (raro 6) deltoideo-oblongis circiter 0.7 mm. longis obtusis margine ciliis glandulosis circiter 0.2 mm. longis copiose ornatis; corolla carnosa rotata circiter 5 mm. diametro profunde 5-lobata, lobis oblongis circiter 1.5 mm. longis latisque rotundatis immerso-glandulosis; antheris subsessilibus oblongo-ovoideis 0.7–0.8 mm. longis obscure glandulosis apice obtusis; ovario sub anthesi conico 0.5–0.8 mm. diametro inconspicue glanduloso, stigmate subsessili peltato circiter 0.7 mm. diametro eroso-marginato, ovulis 3 vel 4.

VITI LEVU: N a n d r o n g a & N a v o s a : Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, alt. 725–825 m., Aug. 7, 1947, *Smith 5546* (A TYPE, US) (“vutuvutu”; slender tree 4 m. high, in dense forest; calyx and corolla deep purplish red; anthers and stigma pale yellow).

*Discocalyx gillespieana* is related to *D. multiflora* Gillespie and *D. sylvestris* A. C. Sm., but both of these have obvious styles, whereas in the new species the stigma is essentially sessile. From *D. multiflora* the present plant also differs in its longer-petiolate and proportionately broader leaves, more compact inflorescence, smaller and less conspicuously glandular corolla, and smaller anthers; from *D. sylvestris* it is further distinguished by its differently proportioned leaves with more numerous secondaries. The three species are certainly close relatives, but I believe that combinations of characters and especially the styler differences amply differentiate them.

## EBENACEAE

*Diospyros foliosa* (Rich. ex Gray) Bakh. in Bull. Jard. Bot. Buitenzorg III. 15: 447. 1941.

*Maba foliosa* Rich ex A. Gray in Proc. Amer. Acad. 5: 326. 1862; Seem. Fl. Vit. 152. 1866; Hiern in Trans. Cambr. Phil. Soc. 12: 113. 1873; Drake, Ill. Fl. Ins. Mar. Pac. 230. 1892.

VANUA LEVU: M a t h u a t a : Southern slopes of Mt. Numbuloa, east of Lambasa, alt. 350–500 m., *Smith 6439* (A, US) (“ulalo”; tree 8 m. high, in rocky forest on steep hillside, the trunk 20 cm. diam.; fruit yellow, at length red; seed edible), *6443* (A, US) (tree 10 m. high, in thin forest on rocky slope; fruit yellow, at length red). Fiji, without definite locality except “Muthuata and Ovalau” [i.e. Mathuata coast of Vanua Levu and island of Ovalau], *U. S. Expl. Exped.* (GH, US 65907 TYPE).

The three available Fijian collections agree in fundamental characters, my no. *6439* being especially similar to the type. Number *6443*, however, differs in having its slightly narrower leaves copiously brown-tomentellous



beneath and its fruits shorter in proportion, nearly subglobose rather than narrowly ellipsoid and about twice as long as broad (as in no. 6439 and the type). These characters, which in the field I took to be significant, probably merely indicate some of the variability to be expected in the species. A few of the older leaves of no. 6443 have become merely canescent-puberulent or nearly glabrous beneath, and some of the fruits vary in shape toward ovoid-ellipsoid.

## SYMPLOCACEAE

### *Symplocos turrilliana* sp. nov.

Arbor ad 10 m. alta, partibus novellis et ramulis apices versus pilis stramineis 0.5–0.8 mm. longis hispidulo-pilosis, ramulis teretibus rugulosis brunneis demum glabrat; petiolis gracilibus leviter canaliculatis 1–3 cm. longis ut ramulis juvenilibus pilosis, laminis foliorum in sicco chartaceis flavo-viridibus oblongo- vel ovato-ellipticis, 6–11 cm. longis, 3–6 cm. latis, basi rotundatis vel obtusis et in petiolum breviter decurrentibus, apice breviter cuspidatis, margine inconspicue crenulatis, supra praecipue costa pilosis mox glabrat, subtus pilis patentibus castaneis 0.3–0.7 mm. longis praesertim costa nervisque subpersistenter hispiduloso-pilosis, costa supra leviter canaliculata subtus prominente, nervis secundariis utrinsecus 5–8 erecto-patentibus curvatis anastomosantibus supra prominulis vel planis subtus elevatis, rete venularum utrinque prominulo vel supra immerso; inflorescentiis axillaribus compactis racemosis vel e basi 2- vel 3-ramosis paucifloris, floribus inclusis haud 1.5 cm. longis, pedunculo brevi ramulisque pilis stramineis 0.2–0.4 mm. longis dense sericeis, bracteis oblongo-semiorbicularibus circiter 1 mm. longis et 1.5 mm. latis rotundatis extus copiose sericeis intus glabris; floribus subsessilibus, pedicello (haud 1 mm. longo) et calyce ut inflorescentiae ramulis sericeis; calyce sub anthesi circiter 2.5 mm. longo et apice 4 mm. diametro, tubo cupuliformi circiter 1 mm. longo, lobis 5 imbricatis, 3 exterioribus papyraceis oblongo-ovatis obtusis 1.5–2 mm. longis latisque intus apicem versus saepe sericeo-puberulis alibi glabris, lobis interioribus submembranaceis ad 2.5 mm. longis extus marginem versus glabris; corolla membranacea sub anthesi rotata 7–8 mm. diametro glabra vel lobis extus obscure puberula, fere ad basim 5-lobata, lobis oblongo-ovatis 3–3.5 mm. longis, 2–2.5 mm. latis apice rotundatis interdum obscure eroso-ciliolatis; staminibus circiter 40–45, 2- vel 3-seriatis, filamentis ligulatis glabris sub anthesi 3–4 mm. longis, antheris subglobosis 0.3–0.4 mm. diametro; stylo tereti circiter 3 mm. longo, stigmatibus obscure lobatis; ovario infero; fructibus ovoideo-ellipsoideis immaturis ad 12 mm. longis puberulis vel glabrat, superne contractis, calycis lobis persistentibus.

VITI LEVU: M b a : Summit of Mt. Nanggaranambuluta [Lomalangi], east of Nandarivatu, alt. 1100–1120 m., June 23, 1947, *Smith 4845* (A TYPE, US) ("kai namo"; tree 5 m. high, in dense forest; petals and filaments white; anthers yellow); summit of Mt. Koroyanitu, high point of Mt. Evans Range, alt. 1165–

1195 m., in dense ridge forest and thickets, *Smith* 4206 (A, US) (tree 10 m. high; young petals white), 4222 (A, US) (tree 8 m. high; flower-buds white; fruit green).

Turrill (in Jour. Linn. Soc. Bot. 43: 30. 1915), in describing the only Fijian species of *Symplocos* as *S. leptophylla* (designated as a new species but actually to be construed as a new combination based on *S. stawellii* var. *leptophylla* Brand, both concepts being typified by *Seemann* 294, from Kandavu), points out its variable nature. My 1947 collection contains 16 numbers, from Viti Levu and Vanua Levu, which may be referred to this broad concept. Obvious variations are to be seen in the indument of the calyx, which ranges from essentially glabrous to copiously sericeous, and in the size and shape of leaves. I am inclined to consider this specific concept too broad, but perhaps it should not be subdivided without careful consideration of species from island groups to the west. Turrill has indicated as forma *compacta* a plant from Nandarivatu with a reduced inflorescence and coriaceous leaves, and probably some of my collections from upland Viti Levu are referable to this form, although the value of the mentioned characters is questionable. All the specimens thus far referred to *S. leptophylla* have the leaves glabrous or merely minutely strigillose on the costa beneath. The new species here proposed differs from *S. leptophylla* in the obvious and persistent indument of its lower leaf-surfaces and in the densely sericeous inflorescence-branches and calyx. As a rule in *S. leptophylla* these inflorescence-parts are merely puberulent or minutely strigillose and glabrescent, but occasionally the pubescence, in type and persistence, approaches that of *S. turrilliana*.

## OLEACEAE

*Linociera vitiensis* A. C. Sm. in Bull. Torrey Club 70: 549. 1943.

*Fagraea vitiensis* Seem. in Bonplandia 9: 257, nomen. 1861; non Gilg & Benedict (1921).

*Olea vitiensis* Seem. Fl. Vit. 155. 1866.

VITI LEVU: *Seemann* 307 (GH, type coll. of *Olea vitiensis*); N a n d r o n g a & N a v o s a : Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, alt. 725–825 m., *Smith* 5632 (A, US). VANUA LEVU: M a t h u a t a : Southern slopes of Mt. Numbuloa, east of Lambasa, alt. 100–500 m., *Smith* 6374 (A, US), 6580 (A, US).

The cited material agrees very well with the type of the species, *Smith* 864, from Taveuni. It had previously escaped my notice that *Seemann's* *Olea vitiensis* is actually a species of *Linociera*, and my inadvertent selection of the same specific epithet makes impossible a combination based on *Seemann's* earlier one. My more recent collections are from trees 8–20 m. high, growing in dense or open forest; all have the fruit immature and orange or dull orange-tinged. The local name *teinivia* was noted for no. 5632.



*Linociera gillespiei* A. C. Sm. in Bull. Torrey Club 70: 548. 1943.

VITI LEVU: Naitasiri: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi [Mt. Victoria] and Nasonggo, alt. 870–970 m., *Smith 5794* (A, US), 6135 (A, US).

The cited specimens, the second and third of the species known to me, were collected in dense forest from trees 15–20 m. high, with green but apparently nearly mature fruit; a local name recorded for no. 6135 is *thaunilawa*. These two collections agree very well with the type, *Gillespie 4289*, from the vicinity of Nandarivatu.

It is curious that all eight collections of *Linociera* now available from Fiji are in fruit, no flowering material having been obtained; this fact makes adequate consideration of the two species impossible. It may be seriously doubted that more than one species of *Linociera* occurs in Fiji, but I cannot make the implied reduction at this time. In general, the leaves of *L. vitiensis* are broader (about twice as long as broad) and thicker, with often immersed veins; the leaves of *L. gillespiei* incline toward lanceolate in shape (about three times as long as broad), have more obvious venation, and dry somewhat darker in color. The recent collections tend to break down the distinctions between the species and, unless future collections indicate the existence of stronger characters, the two entities may be better combined.

#### LOGANIACEAE

*Fagraea gracilipes* A. Gray in Proc. Amer. Acad. 4: 323. 1860; Seem. Fl. Vit. 165. 1866.

*Fagraea viridiflora* Seem. in Bonplandia 9: 257, nomen. 1861.

VITI LEVU: Serua: Vicinity of Ngaloa, *Degener 15101* (A, US, etc.) ("makamakandora"; tree 5 m. high, on inner edge of mangrove swamp; tea from bark and leaves used medicinally; timber considered durable and valuable). OVALAU: *Seemann 306* (source of the name *F. viridiflora*, GH, K). VANUA LEVU: Mathuata: Seanggangga Plateau, in drainage of Korovuli River, vicinity of Natua, alt. 100–200 m., *Smith 6665* (A, US) ("mbuambua"; spreading tree to 10 m. high, in patches of forest in open rolling country, locally frequent but seldom flowering; corolla and filaments cream-white or pale yellow; fruit waxy ivory-white; trunks used as houseposts). Fiji, without definite locality: *U. S. Expl. Exped.* (GH, US 62265 TYPE), *Horne 1124* (GH).

The distribution and habitat of this beautiful endemic tree are more fully indicated above than by the Exploring Expedition and Seemann collections from which it has previously been understood. It is a rare plant in Fiji and was observed by me only once, although in that locality, cited above, it was a frequent component of the low dry forest that occurs on certain reddish clay areas of northern Vanua Levu. The type specimen is accompanied by a detached fruit which obviously represents the other, and more abundant, species of *Fagraea* in Fiji, presumable *F. berteriana* A. Gray (including *F. vitiensis* Gilg & Benedict). The mature fruit of *F. gracilipes* is waxy white, ellipsoid, not much exceeding 2 by 1.5 cm.

## APOCYNACEAE

**Pagiantha thurstonii** (Baker) comb. nov.

*Tabernaemontana thurstoni* Horne, A Year in Fiji, 268, nomen. 1881; Horne ex Baker in Jour. Linn. Soc. Bot. 20: 368. 1883; Burkill in Jour. Linn. Soc. Bot. 35: 46. 1901; Gillespie in Bishop Mus. Bull. 74: 19. fig. 24. 1930.

VITI LEVU: Mba: Western and southern slopes of Mt. Tomanivi [Mt. Victoria], alt. 850–1150 m., *Smith 5089* (A, US) ("nda'alu"; tree 10 m. high, with abundant white latex, on edge of forest; flowers fragrant; corolla-tube greenish, the lobes pure white); Nandronga & Navosa: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, alt. 725–825 m., *Smith 5638* (A, US) ("kau ndrenga"; tree 15 m. high, with abundant white latex, in dense forest; pericarp yellow within, the seeds red); Naitasiri: Nanduna, alt. about 30 m., *B. E. Parham 1049* (A) ("tandalo"; tree 30 m. high, with large white flowers).

The proposed combination (with a change to the termination -ii as recommended by the International Rules) is necessary if one follows Markgraf's revision (in Notizbl. Bot. Gart. Berlin 12: 540–552. 1935) of the Asiatic genera allied to *Tabernaemontana*. *Pagiantha koroana* Markgraf (in op. cit. 549. 1935, in Bishop Mus. Bull. 141: 129. fig. 65, h-k. 1936) is almost certainly the same species. Markgraf apparently overlooked the binomial *Tabernaemontana thurstoni*, as indicated by his remark that: "The present specimen is the first collection of a thick-flowered species of *Tabernaemontana* from Fiji." Gillespie's description and plate of *T. thurstoni* are very adequate; he cites several collections from Viti Levu and Taveuni, which, added to previously collected material, indicate that the species is fairly frequent on the large islands of Fiji.

**Alyxia linearifolia** A. C. Sm. in Sargentia 1: 107. fig. 5. 1942, in Jour. Arnold Arb. 27: 321. 1946.

VITI LEVU: Mba: Vicinity of Nalotawa, eastern base of Mt. Evans Range, alt. 550–600 m., *Smith 4471* (A, US) (shrub 2–3 m. high, the upper branches becoming scandent, in forest along stream; flowers and fruits very scarce; corolla-lobes white; fruit black). VANUA LEVU: Mathuata: Southern slopes of Mt. Numbuiloa, east of Lambasa, alt. 350–500 m., *Smith 6563* (A, US) (shrub 1–2 m. high, becoming scandent, in dense crest forest on summit of southwestern ridge; fruit at length black).

The cited collections agree excellently with the two already known for the species, both from Viti Levu. It is noteworthy that the species is found in Mathuata in the same locality as the following, which is described as a closely allied novelty. The small-leaved *Alyxiae* in Fiji are very puzzling, for which reason I collected all those seen during my 1947 trip. These are too few to permit an accurate picture of the range of variability, but for the time being it seems best to limit *A. linearifolia* to the form with leaves approximately 10–20 times as long as broad (not more than 3.5 mm. in breadth) and parallel-margined.



***Alyxia amoena* sp. nov.**

Frutex scandens copiose ramosus ubique partibus florum exceptis glaber, ramulis gracilibus subteretibus fusco-cinereis; foliis oppositis vel ternatis raro quaternatis, petiolis minutis canaliculatis ad 2 mm. longis, laminis in sicco viridibus chartaceis anguste oblongo-ellipticis, (2-) 3-5 cm. longis, (4-) 5-12 mm. latis, basi obtusis vel acutis et in petiolum decurrentibus, apice obtusis, margine integris et leviter revolutis, costa supra paullo impressa subtus elevata, nervis lateralibus numerosis immersis in nervulum marginalem terminantibus; inflorescentiis axillaribus cymosis 3-5-floris, pedunculo gracili 1-4 cm. longo, bracteis anguste oblongis 1-2 mm. longis obtusis, pedicellis gracilibus (2-) 3-9 mm. longis, bracteolis nullis; calyce sub anthesi 1.6-1.7 mm. longo, lobis erectis membranaceis oblongo-deltaeideis subacutis, 1.2-1.3 mm. longis, 0.6-0.7 mm. latis, obscure ciliolatis; corolla submembranacea, tubo urceolato-cylindrico circiter 3.5 mm. longo, superne circiter 1.5 mm. diametro, basi et apice contracto, intus superne molliter retrorso-piloso, lobis oblongo-ovatis circiter  $2 \times 1.8$  mm. apice rotundatis superne obscure ciliolatis; staminibus circiter 1 mm. infra apicem tubi insertis, filamentis ligulatis circiter 0.3 mm. longis, antheris oblongo-deltaeideis acutis circiter 0.8 mm. longis; disco minuto glabro; carpellis ovoideis distinctis glabris, stylo gracili circiter 1 mm. longo, stigmatibus parvo capitato, ovulis in quoque carpello plerumque 4; fructibus saepe persistenter binis, calyce subpersistente, stipite 2-2.5 mm. longo; drupa ellipsoidea maturitate 7-11 mm. longa et 6-7 mm. diametro, basi et apice obtusa, stylo persistente, pericarpio tenui (haud 0.2 mm. crasso) extus levi vel obscure longitudinaliter sulcato intus ruguloso, semine unico ellipsoideo rugoso.

VANUA LEVU: Mbua: Ramasa Hill, *H. B. R. Parham VIII* (A) (small shrub; flowers white); Mathuata: Southern slopes of Mt. Numbuloa, east of Lambasa, alt. 100-350 m., Oct. 27, 1947, *Smith 6375* (A TYPE, US) ("vono"; liana, in open forest; corolla-lobes white; fruit at length black); summit ridge of Mt. Numbuloa, alt. 500-590 m., *Smith 6498* (A, US) ("vono"; shrub 2 m. high, with subscandent branches, in dense forest; fruit becoming black). OVALAU: Vicinity of Levuka, alt. 125 m., *Gillespie 4568* (GH). Fiji, without definite locality: *U. S. Expl. Exped.* (GH in part, US 65908), *Horne 671* (GH).

The new species is apparently most closely related to *A. linearifolia* A. C. Sm., like which it has, for the genus, narrow leaves and comparatively small flowers and fruits. In foliage *A. amoena* tends to be intermediate between *A. linearifolia* and *A. stellata* (Forst.) R. & S.; in the former the leaves are essentially linear, not more than 3.5 mm. broad, and with parallel margins, while in the latter they are elliptic and usually substantially more than 1 cm. in breadth. The new species also differs from *A. linearifolia* in its usually longer peduncles and pedicels, its larger calyx-lobes, and its glabrous disk. From *A. stellata* (for informative discussions of which see Christophersen, in *Bishop Mus. Bull.* 128: 184. 1935, and F. B. H. Brown, in *op. cit.* 130: 230. 1935) the new species

differs not only in its smaller leaves, but also in its shorter corollas and smaller fruits. Some of the Fijian specimens referred to *A. stellata* (e. g. *Degener* 14825, 14841, and 15255) have leaves nearly as small as those of *A. amoena*, but their fruits are approximately twice as large. A revision of the Pacific *Alyxiae* is much needed, as entities like *A. stellata* have been so widely interpreted in herbaria that their actual limits are uncertain.

Fijian specimens intermediate in foliage between *A. amoena* and *A. linearifolia* are: Viti Levu: Mba: Northern slopes of Mt. Namendre, east of Mt. Koromba [Pickering Peak], alt. 750–900 m., *Smith* 4513 (A, US) (liana, in crest forest on wind-swept ridge; ripe fruit deep purple); Nandronga & Navosa: Southern slopes of Nausori Highlands, above Tumbenasolo, alt. about 450 m., *Greenwood* 1065A (A) (shrub 1 m. high with long twining shoots, in forest; flowers white). These two specimens, from adjacent localities in western Viti Levu, have the leaves shorter and proportionately broader than those of *A. linearifolia* but yet averaging smaller than those of *A. amoena*. The flowers of *Greenwood* 1065A show the large calyx-lobes of *A. amoena*, and I believe this to be the better position for the two collections, although they are not typical.

#### BORAGINACEAE

*Cynoglossum amabile* Stapf & Drummond in Kew Bull. 1906: 202. 1906.

VITI LEVU: Mba: Western slopes of Mt. Nanggaranambuluta [Lomalangi], east of Nandarivatu, alt. 1000–1100 m., *Smith* 4809 (A, US) (naturalized along track in dense forest; corolla bright blue).

Originally described from western Chinese specimens, this species is the “Chinese forget-me-not” of gardens. In Fiji it was naturalized in the indicated locality, probably as an escape from a European garden at Nandarivatu, where, however, it no longer appears to be grown. I am indebted to Dr. I. M. Johnston for the identification; the genus is not otherwise recorded from Fiji.

#### LABIATAE

*Salvia splendens* Sellow ex Roem. & Schultes, Syst. Mant. 1: 185. 1822; Epling in Rep. Sp. Nov. Beih. 85: 94. 1935.

VITI LEVU: Nandronga & Navosa: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, alt. 725–825 m., *Smith* 5398 (A, US) (shrub 1–2 m. high, along trail in forest-grassland transition; calyx bright red).

This frequently cultivated species appeared to be naturalized in the cited locality, which is far from any European settlement; it has not previously been noted from Fiji.



## ACANTHACEAE

**Graptophyllum sessilifolium** sp. nov.

Frutex ad 2 m. altus calycis lobis exceptis ubique glaber, ramulis elongatis gracilibus novellis subcomplanatis demum teretibus cinerascentibus; foliis subsessilibus interdum subamplexicaulibus, petiolis crassis canaliculatis 0.5–2 mm. longis, laminis chartaceis vel subcoriaceis in sicco olivaceo-viridibus oblongis vel anguste ovato-oblongis, (3.5–) 6–9 cm. longis, 2–4 cm. latis, basi leviter cordatis, apice rotundatis vel obtusis, margine integris et leviter revolutis, utrinque cystolithis linearibus 0.2–0.4 mm. longis manifeste ornatis, costa supra leviter subtus valde elevata, nervis secundariis utrinsecus 4–6 arcuato-adscentibus utrinque prominulis vel subimmersis, rete venularum obscuro; inflorescentiis apices ramulorum versus axillaribus cymosis plurifloris ad 5 cm. longis, pedunculo (circiter 1 cm. longo) et ramulis gracilibus subteretibus, bracteis papyraceis lanceolato-deltaeideis acutis 1.5–2 mm. longis subpersistentibus, bracteolis similibus 0.5–1 mm. longis; pedicellis gracilibus sub anthesi et fructu 7–12 mm. longis superne in calycis tubum gradatim incrassatis; calycis lobis 5 erectis lanceolatis, 1.7–2 mm. longis, 1–1.3 mm. latis, acuminatis, extus glabris, intus minute puberulis, inconspicue 3- vel 5-nerviis; corolla membranacea 25–30 mm. longa curvata, tubo circiter 13 mm. longo et 2–2.5 mm. diametro superne in faucem ventricosum sensim ampliato, lobis 5 subaequalibus, 8–9 mm. longis, 3.5–4 mm. latis, apice rotundatis et obscure puberulis, 2 posticis paullo minoribus et altius connatis; staminibus 2 non exsertis, filamentis gracilibus circiter 7 mm. longis, antheris oblongis 3–3.5 mm. longis obtusis; disco carnosio integro ovario haud latiore; ovario oblongo sub anthesi circiter 3 mm. longo in stylum filiformem quam corollam brevior attenuato, stigmate minuto, ovulis in quoque loculo 2 superpositis; capsula anguste obovoidea circiter 2 cm. longa, basi stipitata, apice acuta, seminibus 2 compresso-suborbicularibus conspicue rugulosis.

VANUA LEVU: Mathuata: Southern slopes of Mt. Numbulua, east of Lambasa, alt. 350–500 m., Nov. 10, 1947, *Smith 6566* (A TYPE, US) (shrub 1–2 m. high, with elongate branches, in steep open forest; corolla rich pink).

The closest relative of the new species seems to be *G. insularum* (A. Gray) A. C. Sm., fairly abundant in Fiji (for distributional notes see Sargentia 1: 118. 1942), which, however, has distinctly petiolate leaves, of which the blades are thinner, more obviously nerved, and obtuse to acute at base. Although the flowers of the two species are essentially similar, *G. insularum* often has the inflorescence-branches and pedicels (as well as young vegetative parts) closely puberulent, and the inflorescence comparatively contracted and fewer-flowered.

## COMPOSITAE

*Centipeda minima* (L.) A. Br. & Aschers. Ind. Sem. Hort. Berol. App. 6. 1867.

VANUA LEVU: Mathuata: Seangangga Plateau, in drainage of Korovuli River, vicinity of Natua, alt. 100–200 m., *Smith 6885* (A, US) (on edge of pond in open rolling country; corolla-lobes pale green).

Although I find no previous published record of the occurrence of this plant in Fiji, Mr. William Greenwood has indicated its presence by including it in an unpublished list. In the cited locality in Mathuata the small plants were quite common, although very inconspicuous, growing on moist savanna with *Cyperus polystachyos* Rottb., *Fimbristylis annua* var. *diphylla* (Retz.) Kükenth., *Echinochloa colonum* (L.) Link, *Paspalum orbiculare* Forst., *Jussiaea suffruticosa* var. *ligustrifolia* (H. B. K.) Griseb., *Limnophila fragrans* (Forst.) Seem., and *Erechtites valerianae-folia* DC. Although this would seem to be an association of widespread weeds, I have not seen the *Centipeda* elsewhere in Fiji.

DEPARTMENT OF BOTANY,  
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STUDIES OF PACIFIC ISLAND PLANTS, XII  
THE CUNONIACEAE OF FIJI AND SAMOA

A. C. SMITH

ALTHOUGH THE CUNONIACEAE, a family of considerable size and diversity in New Guinea and New Caledonia, are represented eastward in the Pacific by a sharply decreasing number of members, they are nevertheless a puzzling group in the area under consideration, to judge from the uncertainty of herbarium identifications and the difficulty of analyzing specific criteria. While attempting to place the specimens of the family which I collected in 1947<sup>1</sup>, it seemed desirable to assemble earlier material, to prepare keys, and to redescribe the species, the original descriptions having been based upon too few specimens to show their variability. The place of deposit of specimens cited in this paper is shown as follows: Arnold Arboretum (A); Bernice P. Bishop Museum (Bish); British Museum (BM); Gray Herbarium (GH); New York Botanical Garden (NY); and U. S. National Herbarium (US). The kindness of the authorities of these institutions in permitting study of their material is greatly appreciated.

The Cunoniaceae do not occur in Tonga, on the basis of available records, but in Fiji the family is represented by 14 species and in Samoa by three species, all being endemic to one or the other archipelago. Of the four genera occurring in this area, only *Weinmannia* is widespread, with an extensive distribution mostly in the Southern Hemisphere. *Spiraeanthemum* is found from New Guinea and Australia eastward to Samoa, where its range is terminated by a single species; *Geissois* is more limited, occurring in New Caledonia, Australia, and the New Hebrides, with four species terminating its range in Fiji. Of special interest is the occurrence in Fiji of a species of *Pullea*, a genus previously believed limited to New Guinea.

In this paper three species and three varieties are described as new. Criteria for the demarcation of species in the Cunoniaceae are often neither obvious nor constant, but the genera are well marked. The following key to genera utilizes only characters found in the species of our region:

Inflorescence racemose, the racemes solitary or 2-4 at apex of a short common peduncle or arising from inconspicuous glomerules; ovary 2-carpellate, the capsule septicidally 2-valved; leaves compound or sometimes simple.

Flowers large, the calyx and filaments red, the stamens 8-26, with filaments 11-20 mm. long; petals none; disk pulvinate, entire; ovules numerous,

<sup>1</sup> Under the auspices of the Arnold Arboretum of Harvard University and the John Simon Guggenheim Memorial Foundation, with the aid of grants from the Penrose Fund of the American Philosophical Society and the Bache Fund of the National Academy of Sciences.

- 20–42 per locule, 2-seriate; seeds distally winged; plants with hermaphrodite flowers and 3-foliolate leaves .....1. *Geissois*.
- Flowers small, the petals and filaments white or greenish, the stamens 8, with filaments up to 4 mm. long; petals 4; disk divided into 8 free lobes; ovules 3–12 per locule; seeds comate at both ends, not winged; plants polygamo-dioecious, the leaves pinnate or 3-foliolate or simple .....2. *Weinmannia*.
- Inflorescence paniculate; flowers small, the calyx and filaments white to yellowish or greenish, the petals none, the stamens (6 –) 8–12; the disk divided into lobes; leaves simple.
- Plants dioecious or possibly polygamo-dioecious; inflorescences solitary; ♂ flowers with (3 –) 4–6 free or loosely connate disk-lobes and no carpels; ♀ flowers with (6 –) 8–12 disk-lobes and 4 or 5 (rarely 3 or 6) free carpels, each 1- or 2-ovulate; follicles ventrally dehiscent, the seeds distally winged and usually with a basal wing as well. 3. *Spiraeanthemum*.
- Plants with hermaphrodite flowers; inflorescences paired or ternate, superposed; disk-lobes 10 or 12, often coherent in pairs; ovary 2-carpellate, the ovules 4 per locule. ....4. *Pullea*.

### 1. GEISSOIS Labill.

*Geissois*, originally based on a species from New Caledonia, is now considered to include about 17 species; its range centers in New Caledonia, but species also occur in Australia and the New Hebrides and eastward to Fiji, beyond which the genus does not extend.

In Fiji the local names *vure* and *vota* are usually applicable to *Geissois*, and in some localities *G. ternata* is a frequent and striking component of the vegetation, conspicuous for its beautiful red-flowered inflorescences. Criteria for the recognition of species, insofar as they refer to the size and indument of vegetative parts, are satisfactory within limits. The stipules in particular provide reliable characters, and in the case of *G. superba* the extreme length of the raceme is very obvious. Floral characters are usually too uniform to be of much taxonomic value, although the indument of the ovary, on the contrary, is too variable. In both *G. imthurnii* and *G. ternata* the ovary may vary from glabrous to strigillose or even densely sericeous, and as this variation seems uncorrelated with other characters I have not emphasized it.

In Fiji four species can be discerned, of which one is described as new. By far the greater part of the Fijian population of the genus represents *G. ternata*, which I here divide into four varieties, three of them new.

### KEY TO THE SPECIES

- Inflorescence robust, 22–45 cm. long, the stamens 14–26; leaves comparatively large, the petiole 1.5–8 cm. long, the petiolules 1.5–8 cm. long, the leaflet-blades usually 24–50 × 10–19 cm., with 13–20 secondary nerves per side; stipules large, ovate-oblong, comparatively persistent, up to 60 × 45 mm., proximally laterally connate. ....1. *G. superba*.
- Inflorescence much smaller, not exceeding 10.5 cm. in length, the stamens 8–15; leaves smaller, the petiole not exceeding 5 cm. and the petiolules 6 cm. (usually less than 2.5 cm.) in length, the leaflet-blades not more than



23 × 10.5 cm., usually much smaller, with not more than 15 secondary nerves per side; stipules usually not persistent after attaining a length of about 7 mm., if persistent oblong or elliptic, not more than 20 mm. broad, and laterally free.

Leaflets nearly sessile, the blades rounded to subacute at base, the petiolules of lateral ones up to 2 mm. (rarely to 3 mm.) and of terminal one up to 3 mm. (rarely to 6 mm.) long; leaflet-blades hispidulous on both surfaces, the hairs usually persistent, densest on costa and secondaries; branchlets, petioles, and petiolules copiously setulose or strigillose, rarely subglabrate; inflorescence-rachis and pedicels hispidulous, the calyx-lobes sparsely strigillose on both sides. . . . . 2. *G. imthurnii*.

Leaflets obviously petiolulate, the petiolules usually 4 mm. or more long (if shorter, the leaflet-base attenuate and long-decurrent); leaflet-blades glabrous or faintly strigillose on costa.

Stipules subpersistent, at length ligulate-oblong, up to 10 × 2 cm., copiously hispid without with hairs 1.5–2.5 mm. long, glabrous within; branchlets robust, distally conspicuously flattened, the petioles similarly flattened, copiously hispidulous or strigillose, the petiolules 1.5–6 cm. long, the leaflet-blades 11–23 × 6.5–10.5 cm.; calyx-lobes 6.5–7 mm. long. . . . . 3. *G. stipularis*.

Stipules usually early caducous, if subpersistent apparently not exceeding a size of about 3 × 1 cm., variously pilose or glabrous on both sides; branchlets subterete or distally slightly flattened, the petioles semiterete, sparsely strigillose and glabrate, the petiolules up to 2.5 cm. long, the leaflet-blades usually 2–17 × 1.5–9 cm.; calyx-lobes 4.5–6 mm. long. . . . . 4. *G. ternata*.

1. *Geissois superba* Gillespie in Bishop Mus. Bull 83: 9. fig. 9. 1931.

Tree 10–13 m. or more in height, the branchlets stout (0.8–1.5 cm. in diameter toward apex and there subquadrate or slightly flattened), distally hispidulous or puberulent (hairs 0.1–0.5 mm. long), the older parts glabrate and lenticellate; stipules subcoriaceous, ovate-oblong, rapidly enlarging to about 6 cm. long and 4.5 cm. broad before falling, laterally connate at base, forming a bilobed cupule, recurved at margin, very densely velutinous-hispidulous on both sides (hairs 0.3–0.5 mm. long), rarely glabrate, the scars forming a conspicuous continuous ring; leaves opposite, 3-foliate, the petioles semiterete, stout, 1.5–8 cm. long, hispidulous like branchlets, sometimes glabrate, the petiolules stout, shallowly canaliculate or subterete, 1.5–8 cm. long (terminal slightly the longest), pilose like petioles; leaflet-blades chartaceous to subcoriaceous, elliptic or obovate-elliptic, (15–) 24–50 cm. long, (6–) 10–19 cm. broad, acute to obtuse at base and decurrent on the petiolules, rounded at apex, entire and narrowly recurved at margin, glabrous above or sparsely strigillose on costa and secondaries, beneath strigillose on principal nerves and sometimes on surface, the costa elevated or prominent above, very prominent beneath, the secondary nerves 13–20 per side, erecto-patent, nearly straight, plane or slightly elevated above, prominent beneath, the veinlet-reticulation intricate, prominulous on both surfaces; racemes axillary and borne within the stipule-cupule or lateral below leaves, solitary or paired,

pendent, 22–45 cm. long, the peduncle 3–12 cm. long, stout, terete, curved, with the conspicuously striate rachis sparsely hispidulous; flower-subtending bracts lanceolate, 2–2.5 mm. long, dorsally strigillose, soon caducous, the pedicels strigillose, 7–12 mm. long, articulate near or slightly below middle; calyx-lobes 4, carnosae, becoming subcoriaceous, narrowly deltoid or lanceolate,  $5-6 \times 1.8-2.5$  mm., acute, sparsely strigillose without and more densely hispidulous-tomentellous within (hairs 0.2–0.5 mm. long); stamens 14–26, the filaments 15–20 mm. long, the anthers oblong, about 1 mm. long; disk pulvinate, inconspicuously grooved, 0.5–1 mm. high and about 2 mm. in diameter; ovary copiously hispidulous-tomentellous or merely sparsely strigillose (hairs 0.8–1.3 mm. long), the styles 10–12 mm. long, the ovules about 40 per locule, imbricate, biseriate; receptacle swollen in fruit, the calyx-lobes soon caducous; capsule cylindric, falcate, 15–22 mm. long, persistently strigillose-hispidulous but the hairs often sparse, the pericarp coriaceous, the seeds about 3 mm. long.

**DISTRIBUTION:** Endemic to Fiji and thus far known only from Viti Levu, at elevations up to 900 m. The species is a tree up to 13 m. high or perhaps larger, occurring in forest; the calyx and filaments are crimson and the anthers yellow. *Vure* is a reported local name. The type is *Gillespie* 4274, cited below.

**FIJI: VITI LEVU:** Mba: Between Nandarivatu and Vatuthere, *Gillespie* 3178 (Bish, GH), 4274 (Bish TYPE, GH, K); Nandronga & Navosa: Northern portion of Rairainatuku Plateau, between Nandrau and Rewasau, *Smith* 5434 (A, US); Serua: Korovisilou, *B. E. Parham* 1434 (A); Rewa or Naitasiri: "Central Road, Suva," *Tothill* 471 (K); Viti Levu, without further locality, *Tothill* 189c (K).

The very distinct *G. superba* is readily distinguished from its congeners in Fiji by its robust leaves and elongate inflorescence, and by its characteristically large stipules, which are comparatively persistent and connate into a bilobed cupule.

2. *Geissois imthurnii* Turrill in Jour. Linn. Soc. Bot. 43: 19. 1915, in Hook. Ic. Pl. 31: pl. 3053. 1916.

Tree, to 20 m. high, the branchlets stout, lenticellate, terete or distally flattened, copiously setulose or strigillose with dull yellow hairs 0.3–1 mm. long, rarely subglabrate; stipules elliptic-oblong, usually caducous when very small, very densely setulose on both sides, rarely persisting to a size of about  $5 \times 1.5$  cm., free to base, the scars elongate, straight or slightly curved; leaves opposite, 3-foliolate, the petioles subterete or slightly flattened above, (1–) 1.5–3 cm. long, copiously setulose like young branchlets, rarely glabrate, the petiolules comparatively inconspicuous, copiously setulose, of lateral leaflets 0–2 (–3) mm. long, of terminal leaflet 1–3 (–6) mm. long; leaflet-blades chartaceous to subcoriaceous, oblong- or obovate-elliptic, 6–11.5 (–18.5) cm. long, (2.5–) 3.5–6 (–8.5) cm. broad, broadly obtuse or rounded and inequilateral (lateral leaflets) or subacute (terminal leaflet) at base, obtusely cuspidate to broadly obtuse at apex, entire and slightly recurved at margin, hispidu-



lous on both surfaces with spreading hairs 0.3–0.8 mm. long, rarely subglabrate but usually with persistent indument at least on costa and secondaries, the costa plane or slightly elevated above, prominent beneath, the secondary nerves 9–15 per side, subspreading, curved, prominulous or plane above, strongly elevated beneath, the veinlet-reticulation intricate, slightly prominulous or plane on both surfaces; racemes borne on defoliate branchlets, axillary to leaf-scars, solitary or 2 or 3 arising from an inconspicuous glomerule, 3–10 cm. long, the peduncle 0.5–3.5 cm. long, with the rachis sparsely hispidulous (hairs 0.2–0.4 mm. long); flower-subtending bracts deltoid or lanceolate, 0.8–1.6 mm. long, sparsely setulose without, soon caducous, the pedicels pilose like rachis, 3.5–8 mm. long, articulate slightly below middle; calyx-lobes 4, papyraceous, deltoid-lanceolate, 4.5–6  $\times$  2–2.5 mm., acute, sparsely strigillose on both sides; stamens 9–12, the filaments 13–16 mm. long, the anthers oblong, 1–1.2 mm. long; disk pulvinate, 0.8–1 mm. high, 2–2.5 mm. in diameter; ovary glabrous or with a few stiff hairs or setulose-strigose with hairs 0.5–1 mm. long (sometimes variable on same individual), the styles 9–15 mm. long, the ovules about 40 per locule, biseriate; capsule linear-oblong, falcate, 18–28 mm. long, 3–5 mm. in diameter, glabrous or persistently strigillose, the seeds 4–5 mm. long, the nucellus ellipsoid, about 2.5 mm. long, the wing distal, rounded at apex.

DISTRIBUTION: Endemic to Fiji and thus far obtained only from a limited area near Nandarivatu, Viti Levu, at elevations of 750 to 900 m. It is a tree, recorded as 10–20 m. in height and with a trunk diameter up to 1 m., occurring in forest and on hillsides, mentioned by some collectors as locally common. The calyx and filaments are bright red to deep rose-pink. The local name, as for other species of *Geissois*, is *vure*; im Thurn mentions the name *vunga*, which is usually applicable to *Metrosideros*.

FIJI: VITI LEVU: Mba: Nandarivatu and immediate vicinity, *im Thurn* 137 (Bm, K TYPE), *Parks* 20671 (Bish), *Greenwood* 886 (A, K), *Degener* 14265 (A, Bish, K, NY, US), *Reay* 17 (A, K, US), *Vaughan* 3432 (BM); Nukunuku Creek, *Vaughan* 3401 (BM).

The nearly sessile leaflets and the general pubescence of this plant, which usually persists on the leaflet-blades, differentiate it without difficulty from *G. ternata*. However, transitional forms, in which the petiolules are comparatively obvious (e. g. *Reay* 17), indicate that *G. imthurnii* is not as isolated a taxon as might be inferred from the type specimen alone.

### 3. *Geissois stipularis* sp. nov.

Arbor, ramulis crassis apices versus conspicue complanatis et pilis 0.2–0.5 mm. longis parce strigilloso-puberulis, demum glabratiss cinereisque inconspicue lenticellatis; stipulis papyraceis juventute in gemma compacta subglobosa cohaerentibus, mox accrescentibus subpersistentibus, demum ligulato-oblongis 6–10 cm. longis 1.2–2 cm. latis ad basim liberis apice rotundatis, extus pilis 1.5–2.5 mm. longis copiose hispidis ac etiam minute puberulis, margine puberulo-tomentellis, intus glabris, cicatricibus con-

spicuis leviter curvatis; foliis oppositis 3-foliolatis, petiolis crassis valde complanatis 1.5–5 cm. longis pilis 0.4–0.7 mm. longis copiose hispidulis vel strigillosis, petiolulis canaliculatis vel semiteretibus 1.5–6 cm. longis ut petiolis pilosis vel subglabris; foliolorum laminis coriaceis in sicco brunnescentibus elliptico- vel obovato-oblongis, 11–23 cm. longis, 6.5–10.5 cm. latis, basi obtusis vel subacutis et in petiolulum decurrentibus, apice obtuse cuspidatis, margine integris anguste recurvatis, utrinque glabris vel costa parce strigillosis, costa valida supra leviter elevata subtus prominente, nervis secundariis utrinsecus 8–12 erecto-patentibus supra subplanis subtus prominentibus, rete venularum conspicuo intricato utrinque prominulo vel supra subimmerso; racemis infra folia enatis solitariis 4–8 cm. longis, pedunculo brevi tereti et rhachi striata gracilibus strigilloso-puberulis; bracteis caducis, pedicellis sub anthesi 5–7 mm. longis medium versus articulatis, infra articulationem ut rhachi pilosis superne glabris; calycis lobis 4 carnosis deltoideo-lanceolatis, 6.5–7 mm. longis, 2.5–3 mm. latis, extus glabris, intus pilis pallidis 0.4–0.7 mm. longis hispidulis; staminibus 12 vel 13, filamentis ligulatis sub anthesi 12–15 mm. longis, antheris oblongis 1.2–1.4 mm. longis utroque emarginatis; disco carnosio pulvinato 0.8–1 mm. alto circiter 2.5 mm. diametro; ovario oblongo-conico glabro, stylis 10–12 mm. longis, ovulis biseriatis circiter 30 in quoque loculo.

DISTRIBUTION: Known only from the two collections cited below and perhaps limited to southeastern Viti Levu, Fiji.

FIJI: VITI LEVU: Naitasiri: Tamavua woods, 7 miles from Suva, alt. 150 m., Aug. 9, 1927, *Gillespie 2118* (Bish TYPE, GH, US); Viti Levu, without further data, *Parks 20940* (Bish).

Although the number cited as the type collection is sterile, it bears locality data and shows the foliar and stipular characters that are diagnostic for the species. The Parks specimen is accompanied by inflorescences but is without data; some of his plants were also obtained in southeastern Viti Levu.

Superficially the new species, in its large and long-petiolulate leaflets, suggests *G. superba*, but its leaflets are actually considerably smaller and fewer-nerved than in that species, and its stipules are entirely different. In inflorescence it seems closer to *G. ternata*, but characters pertaining to the stipules and branchlets differentiate it, while the predominantly larger leaves and calyx-lobes of *G. stipularis* are also characteristic.

4. *Geissois ternata* A. Gray, Bot. U. S. Expl. Exped. 1: 679. *pl. 86*. 1854.

Shrub or tree, up to 25 m. high, the branchlets subterete or distally flattened, sparsely strigillose with hairs 0.2–0.3 mm. long, soon glabrate, lenticellate; stipules ovate to oblong or elliptic, usually caducous when small, copiously setulose or strigillose to glabrous, rarely persisting to a size of 3 cm. long, free to base, the scars elongate, callose-thickened; leaves opposite, 3-foliolate, the petioles semiterete, 7–35 (–50) mm. long, sparsely strigillose when young, glabrate, the petiolules slender, shallowly



canaliculate, strigillose like petioles and soon glabrate, of lateral leaflets 1–20 mm. long, of terminal leaflet to 25 mm. long; leaflet-blades subcoriaceous or chartaceous, elliptic or obovate-elliptic, 3–17 (–19) cm. long, (1.2–) 1.5–9 (–10.5) cm. broad, obtuse to attenuate at base and decurrent on the petiolule, rounded to obtusely cuspidate or acuminate at apex, entire at margin and plane or narrowly recurved (rarely denticulate-serrulate), glabrous on both surfaces or faintly strigillose on costa beneath, the costa plane or slightly elevated above, prominent beneath, the secondary nerves 5–13 per side, spreading or ascending, slightly curved, plane or prominulous above, slightly elevated beneath, the veinlet-reticulation intricate, prominulous on both surfaces or immersed above; racemes borne on defoliate branchlets, solitary or 2 or 3 arising from a small glomerule, 2.5–10.5 cm. long, the peduncle subterete, 0.5–2 cm. long, with the slightly angled rachis glabrous or faintly strigillose-puberulent; flower-subtending bracts lanceolate, 1.2–1.5 mm. long, glabrous or very sparsely strigillose dorsally, soon caducous, the pedicels 4–10 mm. long, articulate near middle or slightly above middle or sometimes near base, glabrous; calyx-lobes 4, papyraceous or carnose, lanceolate or narrowly deltoid,  $4.5-6 \times 1.4-3$  mm., glabrous on both sides or sparsely strigose to crispate-pilose within; stamens 8–15, the filaments 11–18 mm. long, the anthers ellipsoid or oblong, 0.8–1.2 mm. long; disk pulvinate, 0.5–1.2 mm. high, 1.5–2 mm. in diameter; ovary glabrous or sparsely strigillose with hairs 0.3–0.7 mm. long (rarely densely strigose-sericeous), the styles 8–13 mm. long, the ovules 20–42 per locule, biseriate; capsule cylindric, falcate, 12–27 mm. long, 3–5 mm. in diameter, glabrous or strigillose to setulose-puberulent, the seeds about 5 mm. long, the nucellus ellipsoid, the wing distal, rounded at apex.

**DISTRIBUTION:** Throughout Fiji, endemic, at elevations up to 1050 m. The species is a shrub or tree, up to 25 m. in height, occurring in a variety of habitats, including forest, hillside thickets, open places, etc. The calyx, filaments, and styles are deep red or bright red, the anthers, disk, and ovary yellow, and the fruit dull yellow or red-tinged, becoming brown. Local names for this common species are *vure* and *vota*, sometimes *vurevure*, and rarely *vunga*.

The residual population of *Geissois* in Fiji, when reasonably well characterized taxa like *G. superba*, *G. imthurnii*, and *G. stipularis* have been segregated, may be designated as *G. ternata*. Superficial acquaintance with this population shows that it is fairly heterogeneous, but detailed examination does not disclose obvious lines of differentiation. Nevertheless the available material seems too diverse to be left in a single taxon, and one is able to discern in it various morphological tendencies that seem usable for the establishment of infraspecific groups. The four groups here proposed as varieties are far from satisfactory, but I believe that their recognition permits a better understanding of *G. ternata*.

Of the proposed varieties, the best marked is characterized by a reduction in size of leaves and number of floral parts; the leaflet-blades tend to be blunter at apex and more attenuate at base, and concomitantly the

stamens are reduced in number (8–12), the disk is shorter, and the ovules are comparatively few (20–34 per locule). The latter character, although impracticable for general use, suggests that the tendencies here recognized are not entirely superficial. This variety (var. *minor*) usually occurs at high elevations or in exposed places.

A proposed variety (var. *serrata*) known only from the Yasawa Group differs from the typical form in its comparatively large leaflets with serrulate margins (the species otherwise having entire leaflets), and also in the longer indument of its stipules. The value of this variety can scarcely be assessed without more material, but it seems inadvisable to include a form with toothed leaflets with typical material.

The remaining specimens are more homogeneous, although there is still a great deal of variation in leaf-size. Two types of stipule-indument are discernible; these organs may be copiously setulose with spreading hairs or they may be essentially glabrous (with hairs, when present, of a closely appressed type). This character may not be very consequential, but it is readily observed and is fairly constant, the apical stipules being present even on specimens in advanced fruiting stages. The type of the species falls into the first group, with setulose stipules (var. *ternata*), and the other group I propose as var. *glabrior*. Elsewhere in the Cunoniaceae the type of stipule-indument is a reliable character and is correlated with other criteria; in the present case it seems to be supported by no other consistent characters.

#### KEY TO THE VARIETIES

Leaves comparatively large, the petiolules (2–) 4–25 mm. long, the leaflet-blades usually  $5-17 \times 3-9$  cm., obtuse to acute at base, obtusely cuspidate to acuminate at apex; inflorescence 4–10.5 cm. long, the stamens 12–15, the disk 0.8–1.2 mm. high, the ovules 36–42 per locule.

Leaflet-blades entire, usually  $5-15 \times 3-7.5$  cm., the secondary nerves 5–11 per side.

Stipules copiously setulose with spreading hairs 0.2–1 mm. long. .... 4a. var. *ternata*.

Stipules glabrous on both sides or strigillose with appressed hairs 0.1–0.4 mm. long, sometimes puberulent-tomentellous at margin. .... 4b. var. *glabrior*.

Leaflet-blades obviously denticulate-serrulate at margin, large, usually  $9-17 \times 4-9$  cm., the secondary nerves 9–13 per side; stipules copiously setulose with hairs 1.5–2 mm. long. .... 4c. var. *serrata*.

Leaves comparatively small, the petiolules 1–11 mm. long, the leaflet-blades usually  $3-9.5 \times 1.5-5$  cm., attenuate at base, obtuse to rounded at apex, entire; stipules copiously setulose; inflorescence 2.5–8 cm. long, the stamens 8–12, the disk 0.5–0.6 mm. high, the ovules 20–34 per locule. 4d. var. *minor*.

#### 4a. *Geissois ternata* var. *ternata*.

*Geissois ternata* A. Gray, Bot. U. S. Expl. Exped. 1: 679. *pl.* 86. 1854; Seem. Fl. Vit. 109. 1865; Pampan. in Ann. di Bot. 2: 58. 1905; Gibbs in Jour. Linn. Soc. Bot. 39: 144. 1909.



The typical variety, characterized by having stipules copiously setulose with spreading hairs 0.2–1 mm. long; petiolules (2–) 4–25 mm. long; leaflet-blades (4–) 5–15 (–19) cm. long, (2–) 3–7.5 (–10.5) cm. broad, acute to obtuse at base, obtusely cuspidate at apex, entire at margin, the secondary nerves 5–11 per side; racemes 4–10.5 cm. long, the stamens 12–15, the disk 0.8–1.2 mm. high, the ovules 36–42 per locule.

**DISTRIBUTION:** Known from several of the islands, at elevations from near sea-level up to 900 m., and apparently the most abundant variety on Viti Levu. The type material, obtained by the U. S. Exploring Expedition, comes from at least two plants, obtained on Ovalau and in the Province of Mathuata, Vanua Levu.

**FIJI:** VITI LEVU: *Graeffe* (K), 27 (BM); Mba: Northern portion of Mt. Evans Range, between Mt. Vatuyanitu and Mt. Natondra, *Smith* 4271 (A, US); vicinity of Nandarivatu, *Gibbs* 591 (BM), *Smith* 5969 (A, US); Nandronga & Navosa: Southern slopes of Nausori Highlands, in drainage of Namosi Creek above Tumbenasolo, *Smith* 4605 (A, US); vicinity of Mbalo, near Vatukarasa, *Degener* 15274 (A, Bish, K, NY, US); Serua: Mbuyombuyo, near Namboutini, *Tabualewa* 15609 (A, Bish, K, NY, US); Thulanuku, near Ngaloa, *Degener* 15120 (A, Bish, K, NY, US). KANDAVU: *Seemann* 201 (BM, GH, K); hills above Namalata and Ngaloa Bays, *Smith* 76 (Bish, GH, K, NY, US). OVALAU and VANUA LEVU: *U. S. Expl. Exped.* (GH, K, NY, US 47817 and 47818 TYPE). Fiji, without definite locality: *Horne* (GH).

#### 4b. *Geissois ternata* var. *glabrior* var. nov.

Frutex vel arbor grandis a var. *ternata* stipulis utrinque glabris vel pilis adpressis 0.1–0.4 mm. longis strigillosis interdum margine puberulotomentellis differt.

**DISTRIBUTION:** Recorded from several islands in Fiji, at elevations from near sea-level up to 500 m.; it seems to have a more easterly distribution within the group than var. *ternata*. As type I designate *Smith* 1590, from Vanua Levu, a collection with flowers and fruits which also shows the diagnostic stipule character.

**FIJI:** VITI LEVU: Namosi: Between Namuamua and Laselase, *Gillespie* 3213 (Bish, GH, K, NY). VANUA LEVU: Mba: Upper Ndama River Valley, Apr. 24, 1934, in dense forest at 100–300 m., *Smith* 1590 (Bish, GH, K, NY TYPE, US); Thakaundrove: Hills south of Nakula Valley, *Smith* 343 (Bish, GH, K, NY, US); Valanga, Savu Savu Bay region, *Degener & Ordenez* 14034 (A). TAVEUNI: Vicinity of Waiyevo, *Gillespie* 4699 (Bish, K, NY, US); western slope, between Somosomo and Wairiki, *Smith* 847 (Bish, GH, K, NY, US). Koro: Western slope, *Smith* 1085 (Bish, GH, K, NY, US). VANUA MBALAVU: Slopes of highest peak, *Bryan* 583 (Bish); near Lomaloma, *Smith* 1424 (Bish, K, NY). LAKEMBA: *Harvey* (GH, K).

#### 4c. *Geissois ternata* var. *serrata* var. nov.

Arbor ad 15 m. alta, stipulis pilis 1.5–2 mm. longis dense setosis, petiolis (10–) 17–25 mm. longis, petiolulis (5–) 12–25 mm. longis, foliolorum laminis ovatis vel ellipticis, (6–) 9–17 × (2.5–) 4–9 cm., apice obtuse cuspidatis vel acuminatis, margine saltem supra medium denticulato-

serrulatis (dentibus 1–3 per centimetrum parvis superne calloso-apiculatis), nervis secundariis utrinsecus 9–13; a var. *ternata* foliolorum laminis manifeste serrulatis, magnis, apice saepe acuminatis, nervis secundariis numerosis, stipularum pilis longioribus differt.

DISTRIBUTION: Known only from the type collection, from Waya Island in the Yasawa Group, northwest of Viti Levu.

FIJI: WAYA, Yasawa Group: North of Yalombi, woods along Olo Creek, alt. 120–240 m., July 19, 1937, *St. John 18128* (Bish TYPE, US) (“vunga”; tree 15 m. high, common, the trunk 8–10 cm. in diameter; flowers red; wood used for houses; birds visit the flowers).

#### 4d. *Geissois ternata* var. *minor* var. nov.

Frutex vel arbor ad 4 m. alta, stipulis eis var. *ternatae* similibus; petiolis 7–25 mm. longis, petiolulis 1–11 mm. longis, foliolorum laminis anguste ellipticis vel lanceolato-ellipticis, 3–9.5 × (1.2–) 1.5–5 cm., basi attenuatis, apice obtusis vel rotundatis, nervis secundariis utrinsecus 5–8; racemis 2.5–8 cm. longis, staminibus 8–12, disco 0.5–0.6 mm. alto, ovulis 20–34 in quoque loculo; a var. *ternata* foliis minoribus, foliolorum laminis basi attenuatis apice saepe rotundatis, inflorescentia minore, staminibus et ovulis paucis, disco brevioris differt.

DISTRIBUTION: Known from the two large islands of Fiji, often at comparatively high elevations (500–1050 m.), where it occurs in forest, dense thickets, or in exposed places. It is a comparatively small plant, noted as a gnarled shrub or a tree 2–4 m. high. The type, a specimen with flowers, young fruits, and characteristically small leaves, is *Smith 679*, from Vanua Levu.

FIJI: VITI LEVU: Mba: Mt. Evans Range, *Greenwood 119* (K); Tholo-i-Nandarivatu, *Gillespie 3898* (Bish); Namosi: Summit of Mt. Voma, *Gillespie 2730* (Bish). VANUA LEVU: Mathuata: Summit ridge of Mt. Numbuiloa, east of Lambasa, *Smith 6514* (A, US); Thakaundrove: Summit of Mt. Mbatini, alt. 1030 m., Nov. 29, 1933, *Smith 679* (Bish, GH, K, NY TYPE, US).

## 2. WEINMANNIA L.

The genus *Weinmannia*, as here considered, is represented by five species in Fiji and two in Samoa, being absent from Tonga as far as known. The Fijian and Samoan species appear to be endemic, records of their occurrence in more than one archipelago being discussed below. The genus is not a common component of the vegetation in either group. Criteria for specific delimitation in *Weinmannia* are not satisfactory, such characters as simple vs. pinnate leaves and degree of indument being highly variable. To a certain extent more dependable characters are found in the shape of stipules, the persistent or caducous nature of the calyx, and the number of ovules. In my observation, the Fijian species have the ovules 3–6 per locule as opposed to 8–12 in the Samoan species. Leaflet-shape is a usable character only within very broad limits; one species, here described as new, is characterized by very small leaves and compact

inflorescences. All the species of our region are probably polygamodioecious; staminate flowers have comparatively long filaments, short styles, and sterile carpels, while hermaphrodite flowers have shorter filaments, longer styles, and readily observed ovules in the carpels. Superficially the two types of flower are not easily distinguished. It may be noted that the Fijians seem to have no common name for *Weinmannia* which is generic in nature, as they do for *Spiraeanthemum* and *Geissois*.

#### KEY TO THE SPECIES

- Leaves simple, rarely 2- or 3-foliolate, the blades up to  $11 \times 6$  cm.; stipules ovate to elliptic or suborbicular-obovate, entire, often nearly as broad as long; perianth (at least in no. 1) comparatively large, the sepals 1.2–1.5 mm. long, the petals 1.6–1.8 mm. long; perianth caducous in fruit.  
 Stipules comparatively large,  $13\text{--}25 \times 10\text{--}15$  mm., conspicuously barbellate in axils, the tufts of hairs often subpersistent; leaves nearly always simple, very rarely 2-foliolate, the blades oblong-elliptic, usually  $7\text{--}11 \times 2.5\text{--}6$  cm., the marginal crenations usually 1 or 2 per centimeter; ovules usually 4 per locule; seeds copiously comate at both ends, the hairs 0.7–1 mm. long, with obvious cross-walls; Fiji .....1. *W. affinis*.
- Stipules smaller,  $6\text{--}12 \times 2\text{--}9$  mm., not barbellate in axils or very inconspicuously so; leaves simple or 3-foliolate, the blades predominantly lanceolate, usually  $4\text{--}10 \times 1.3\text{--}4$  cm., the marginal crenations usually 3 or 4 per centimeter; ovules 10–12 per locule; seeds more sparsely comate at both ends, the hairs 0.4–0.5 mm. long, the cross-walls inconspicuous; Samoa .....2. *W. manuana*.
- Leaves compound, 3–9-foliolate, rarely 1-foliolate; perianth (not known for no. 3) comparatively small, the sepals less than 1.2 mm. long, the petals less than 1.6 mm. long.  
 Leaflets comparatively large, only rarely less than  $2 \times 1$  cm., usually much larger, the marginal crenations only rarely as few as 8 per side; racemes more than 4 cm. long, often up to 12 cm. or longer.  
 Leaves with the petiole, rachis, and lower leaflet-surfaces hispidulous (hairs 0.5–1 mm. long); stipules suborbicular or ovate-oblong, about  $10 \times 7\text{--}10$  mm., conspicuously dentate; known only in sterile condition; Fiji .....3. *W. spiraeoides*.
- Leaves glabrous or with the petiole, rachis, and costa of lower leaflet-surfaces puberulent (hairs up to 0.2 mm. long), or in the Samoan species the petiole and costa sometimes strigose (hairs 0.5–1 mm. long); stipules entire.  
 Stipules suborbicular, very variable in size but usually slightly broader than long; leaves variable, with (1–) 3–9 leaflets, these predominantly elliptic or oblong-elliptic; sepals 0.5–0.7 mm. long; petals 1–1.3 mm. long; ovules 4–6 per locule; perianth persistent in fruit; Fiji .....4. *W. richii*.
- Stipules oblong or ovate to lanceolate, longer than broad; leaflets predominantly lanceolate or lanceolate-elliptic; sepals 0.7–1.2 mm. long; petals 1.1–1.6 mm. long; perianth caducous in fruit.  
 Ovules usually 4 per locule; leaves (as far as known) 3-foliolate, all of the leaflet-blades attenuate at base; Fiji. ....5. *W. vitiensis*.  
 Ovules 8–12 per locule; lateral leaflet-blades with the lower basal margins obtuse or rounded; Samoa.



- Leaves 3-9-foliolate (very rarely simple), the leaflet-blades 1-2.5 cm. broad. ....6. *W. samoensis*.  
 Leaves sometimes 3-foliolate, usually simple, the blades 1.3-4 cm. broad. ....2. *W. manuana*.  
 Leaflets small, 8-16 mm. long, 3-6 mm. broad, with 3-6 marginal crenations per side; stipules suborbicular, 2-4 mm. in diameter, strongly revolute; racemes 2-3 cm. long; Fiji. ....7. *W. exigua*.
1. *Weinmannia affinis* A. Gray, Bot. U. S. Expl. Exped. 1: 674. 1854; C. Muell. in Walp. Ann. Bot. Syst. 5: 30. 1858; Seem. Fl. Vit. 110. 1865; Engl. in Linnaea 36: 648. 1870; Pampan. in Ann. di Bot. 2: 92. 1905; Gibbs in Jour. Linn. Soc. Bot. 39: 145. 1909.

Shrub or small tree, the branchlets glabrous or inconspicuously puberulent distally; stipules chartaceous or subcoriaceous, elliptic or suborbicular-obovate, entire, 13-25  $\times$  10-15 mm., obtuse at apex, conspicuously barbellate in axils, the hairs (pale, stiff, 1-1.5 mm. long) often subpersistent; leaves glabrous, simple, rarely 2-foliolate, the petioles (4-) 8-17 mm. long (20-25 mm. long in compound leaves, then the leaflets sessile), the blades subcoriaceous, oblong-elliptic, (3.5-) 7-11 cm. long, (1.5-) 2.5-6 cm. broad, acute to obtuse at base and decurrent, obtuse or obtusely cuspidate at apex, conspicuously crenate-serrate with 1 or 2 crenations per centimeter, the venation obvious, the secondary nerves 7-14 per side, the veinlet-reticulation usually prominulous on both surfaces; racemes usually paired or ternate at apices of peduncles (1.5-4 cm. long), 4-9 cm. long, the peduncle, rachis, and pedicels puberulent (hairs 0.1-0.2 mm. long), sometimes glabrate; flowers crowded, sometimes pseudovercillate, the pedicels 1.3-2 mm. long or slightly shorter at anthesis; sepals essentially glabrous, oblong, 1.2-1.5  $\times$  0.7-1 mm., rounded at apex; petals membranaceous, oblong, 1.6-1.8  $\times$  0.9-1.2 mm., rounded at apex; disk-lobes oblong-clavate, 0.5-0.7 mm. long; stamens with filiform filaments up to 4 mm. long (in  $\delta$  flowers) and anthers 0.3-0.4 mm. in diameter; carpels ovoid, minutely hispidulous-puberulent, the styles less than 1 mm. long at anthesis, the ovules usually 4 per locule (in  $\varnothing$  flowers, none or undeveloped in  $\delta$  flowers); perianth soon caducous; capsule ellipsoid, 2.5-4 mm. long, usually persistently puberulent, the styles up to 1.5 mm. long; seeds 0.5-0.8 mm. long, copiously and persistently comate at both ends, the hairs 0.7-1 mm. long, many-celled, crispate.

DISTRIBUTION: Endemic to Fiji, thus far known from Viti Levu, Ovalau, and Taveuni but doubtless to be expected from other high islands, at elevations of 350-1200 m. (as far as recorded). It is a shrub or small tree, up to 7 m. in height, usually occurring in dry forest or ridge forest or on dry open ridges, occasionally in wetter localities. The petals and filaments are white and the capsules red. Recorded local names are *vure* (Gillespie 2736) and *katakata* (Smith 4905), names usually referred to the genera *Geissois* and *Spirueanthemum* respectively. The type, cited below, is an Exploring Expedition specimen from Ovalau.

FIJI: VITI LEVU: Seemann 197 (BM, GH, K); Mba: Mountains near Lautoka, Greenwood 247 (K); vicinity of Nandarivatu, Gibbs 642 (BM, K),

733 (BM), 881 (BM, K), *Greenwood* 864 (A, K, US), *Smith* 4905 (A, US), *Vaughan* 3405 (BM); Nandronga & Navosa: Southern slopes of Nausori Highlands, above Tumbenasolo, *Greenwood* 1188 (A); Namosi: Mt. Korombasambasanga, *B. E. Parham* 2201 (A); Mt. Voma, *Gillespie* 2736 (Bish), *B. E. Parham* 602 (A), 2598 (A). OVALAU: *U. S. Expl. Exped.* (GH, K, NY, US 48070 TYPE), *Graeffe* (K). TAVEUNI: Borders of lake east of Somosomo, *Smith* 878 (Bish, K, NY); Vuna, *Seemann* 200 (BM, GH, K). Fiji, without definite locality: *Horne* 916 (GH, K), *Gillespie* 2730 (Bish).

The cited specimens probably give a fair picture of the variation to be expected in *W. affinis*, which is without difficulty recognized by its simple (only very rarely 2-foliolate) leaves with proportionately broad and coarsely crenate blades. Its flowers are slightly larger than those of other species of our region, and in general the indument is negligible. The type material is among the larger in foliage-dimensions, and from it there is a series of specimens toward such small-leaved forms as that found on Taveuni (e. g. *Smith* 878, which also has the inflorescence strictly glabrous). Gray's var.  $\beta$ , with 3-foliolate leaves, may be referred to *W. vitiensis*, as suggested by Seemann. The closest ally of *W. affinis* seems to be the Samoan *W. manuana*, as noted below.

2. *Weinmannia manuana* Christophersen in Bishop Mus. Bull. 154: 10. fig. 2. 1938.

*Weinmannia affinis* sensu Reinecke in Bot. Jahrb. 25: 635. 1898; Christophersen in Bishop Mus. Bull. 154: 9. 1938; non A. Gray.

Shrub or small tree, rarely epiphytic, the branchlets in distal internodes strigose with hairs up to 1 mm. long or glabrous; stipules ovate or elliptic, entire,  $6-12 \times 2-9$  mm., obtuse or subacute at apex, soon glabrate, not (or very obscurely) barbellate in axils; leaves simple or 3-foliolate, the petioles 3-30 mm. long, often strigose like young branchlets but soon glabrate, the blades (sessile in lateral leaflets of compound leaves, with petiolules 5-10 mm. long and winged in terminal leaflets) chartaceous, lanceolate, (3-) 4-10 cm. long, (1-) 1.3-4 cm. broad, acute to attenuate at base and decurrent (or lateral leaflets of compound leaves with the lower edge of base rounded), obtusely cuspidate or short-acuminate at apex, crenate with (2-) 3 or 4 crenations per centimeter, the costa often hirtellous beneath but soon glabrate, the secondary nerves 8-14 per side, prominulous or nearly plane, the veinlet-reticulation copious, essentially plane; racemes usually ternate at apices of peduncles (0.8-1.5 cm. long), 4-8 cm. long, the peduncle, rachis, and pedicels pale-puberulent, subglabrate, the subtending bracts lanceolate, about 1 mm. long, caducous; pedicels 1.5-2 mm. long (or slightly shorter at anthesis); sepals ovate-oblong,  $0.7-1.1 \times 0.7-0.9$  mm., rounded at apex; petals membranaceous, oblong,  $1.3-1.6 \times 0.8-1$  mm., rounded at apex; disk-lobes 0.4-0.5 mm. long; stamens with filiform filaments 1-1.5 mm. long (in  $\varnothing$  flowers) or up to 3 mm. long (in  $\sigma$  flowers), the anthers 0.3-0.4 mm. in diameter; carpels ovoid, strigose in bud, the ovules 10-12 (in  $\varnothing$  flowers, undeveloped

in ♂ flowers); perianth soon caducous; capsules ellipsoid, 3.5–4 mm. long, obscurely puberulent or glabrate, the styles 1–1.5 mm. long; seeds 0.6–0.8 mm. long, comate at both ends, the hairs comparatively sparse, 0.4–0.5 mm. long and with inconspicuous cross-walls.

DISTRIBUTION: Limited to Samoa and apparently to be expected throughout the group, at elevations of 480–1500 m. It has been recorded as a shrub or tree 1–7 m. in height, occurring in forest, in wet scrub-forest, on high ridges, and on open old lava fields. The type is *Garber 1031*, from Olosenga, cited below.

SAMOA: SAVAI: Above Aopo, *Christophersen 889* (Bish, NY); Aopo-Gaganalae, *Christophersen 3446* (Bish); Matavanu crater, *828* (Bish, US), *2222* (Bish). TUTUILA: Le Pioa, at top, *Christophersen 1201* (Bish, NY), *3565* (Bish). OLOSENGA: Piumafua Mt., at top, *Garber 1027* (Bish), *1031* (Bish TYPE); Piumafua ridge, *Garber 1066* (Bish). TAU: Trail to peak, *Garber 720* (Bish, US). Samoa, without definite locality: *U. S. Expl. Exped.* (US 66032).

The specimens which Christophersen referred to *W. affinis* have been carefully compared with the type and other Fijian specimens, and also with *W. manuana*, and it appears to me that they represent the latter and that true *W. affinis* does not occur in Samoa. In proposing *W. manuana*, Christophersen separated it from *W. affinis* on the basis of its densely hirtellous young branches and inflorescences and the more prominent crenation of the leaves. While these characters are valid as far as the two type collections are concerned, examination of other material of this relationship shows that the indument is too variable to be very useful; in the Fijian material the young branchlets and inflorescence vary from copiously puberulent to glabrous, and in the Samoan material from somewhat strigose or merely puberulent to glabrous. Characters pertaining to leaf-shape and marginal crenations are apparent but are also very variable, while the flowers (sepals, petals, and disk-lobes) of *W. affinis* are slightly larger than the corresponding parts in *W. manuana*. More dependable characters in differentiating these species pertain to the stipules, number of ovules, and seed-indument, but these characters are either minute or transitory. Nevertheless it seems reasonable to separate the Fijian and Samoan populations as indicated in my key.

3. *Weinmannia spiraeoides* A. Gray, Bot. U. S. Expl. Exped. 1: 677. 1854; C. Muell. in Walp. Ann. Bot. Syst. 5: 30. 1858; Seem. Fl. Vit. 110. 1865; Engl. in Linnaea 36: 644. 1870.

Small tree, the branchlets, at least distally, copiously setulose with pale hairs 0.5–0.8 mm. long; stipules suborbicular or ovate-oblong, about 10 × 7–10 mm., conspicuously dentate with 7–9 teeth, sparsely setulose on both surfaces; leaves 5-foliolate (as far as known), the petioles 13–27 mm. long, like the rachis and petiolules very slender, copiously hispidulous with hairs 0.5–1 mm. long, the petiolules (of lateral leaflets) 1 mm. long or less, of terminal leaflet 5–10 mm. long, the leaflet-blades chartaceous,



lanceolate-elliptic, (2.5-) 3-6 cm. long, 1-2.5 cm. broad, acute to attenuate at base, acute or obtusely cuspidate at apex, conspicuously serrate with 3 or 4 teeth per centimeter, copiously hispidulous beneath especially on nerves, often subglabrate above except on costa, the secondary nerves 5-9 per side, prominulous or nearly plane like the veinlet-reticulation; inflorescences unknown.

DISTRIBUTION: Known only from the type collection, from the island of Ovalau, Fiji, at about 150 m.

FIJI: OVALAU: *U. S. Expl. Exped.* (US 48073 TYPE).

The sterile specimen so optimistically described by Gray as a new species has not yet been matched among more recent collections, and it may conceivably represent a distinct species. However, the possibility cannot be ignored that this specimen may be merely a juvenile form of some other taxon, perhaps of *W. richii*. Nevertheless, juvenile forms of *W. richii* so far available do not show the dentate stipules or the type of leaf-indument described for *W. spiraeoides*, which for the time being is accepted as a separate, if quite unsatisfactory, entity.

4. *Weinmannia richii* A. Gray, Bot. U. S. Expl. Exped. 1: 675. *pl.* 85, B. 1854; C. Muell. in Walp. Ann. Bot. Syst. 5: 30. 1858; Seem. Fl. Vit. 110. 1865; Engl. in Linnaea 36: 643. 1870.

*Weinmannia rhodogyne* Gibbs in Jour. Linn. Soc. Bot. 39: 145. 1909; Turrill in Jour. Linn. Soc. Bot. 43: 20. 1915.

Shrub or small tree, often compact, up to 7 m. high, the branchlets sparsely to copiously puberulent distally with hairs 0.1-0.2 mm. long, often glabrate; stipules chartaceous, suborbicular, 1.5-12  $\times$  1.5-16 mm., rounded at apex, entire, sericeous-puberulent on both sides but usually glabrate, strigose-tufted in axils; leaves 3-9-foliolate (very rarely simple), the petioles 0.7-3 cm. long, puberulent like young branchlets or glabrous, the rachis similar, narrowly winged or flattened above in distal internode, the lateral petiolules up to 2 mm. long or essentially none, the terminal petiolule 3-15 mm. long, distally winged, often puberulent, the blades subcoriaceous or chartaceous, elliptic or oblong-elliptic, (1.5-) 3-7 cm. long, (1-) 1.2-3.8 cm. broad (terminal rarely to 9.5  $\times$  4.5 cm.), acute to attenuate at base and decurrent, obtusely cuspidate at apex, crenulate with 2 or 3 crenations per centimeter, glabrous (or puberulent beneath on costa and rarely on lower part of blades), the secondary nerves 7-9 per side, with the veinlet-reticulation prominulous on both surfaces, or the veinlets subimmersed; racemes 2-4 (often ternate) at apices of peduncles (1-10 mm. long) or sometimes solitary, the peduncle, rachis, and pedicels puberulent like young branchlets, rarely glabrate, the racemes 4-12 (-14.5) cm. long, the flowers crowded, subfasciculate in groups of 2-8; pedicels at anthesis 0.7-1.5 mm. long, in fruit up to 2 mm. long; sepals oblong-ovate, 0.5-0.7  $\times$  0.4-0.6 mm., obtuse at apex, essentially glabrous but sometimes sparsely pilose distally or ciliolate; petals membranaceous,

obovate-oblong,  $1-1.3 \times 0.6-0.8$  mm., rounded or obscurely retuse at apex; disk-lobes 0.2–0.4 mm. long; stamens with filiform filaments up to 2.5 mm. long, the anthers about 0.3 mm. in diameter; carpels ovoid, crispate-pilose with pale hairs 0.2–0.4 mm. long, the styles up to 1.5 mm. long, the ovules 4–6 per locule in  $\varnothing$  flowers; calyx and often petals usually persistent, even after carpel has shattered; capsules narrowly ellipsoid, up to 3.5 mm. long, sparsely soft-pilose, eventually subglabrate, the styles persistent; seeds about 0.7 mm. long, comate at both ends, the hairs 0.7–1.5 mm. long, with obscure cross-walls.

DISTRIBUTION: Limited to Fiji, thus far known from Viti Levu, Vanua Levu, and Taveuni but doubtless occurring on other islands. Elevations of 100 to 1100 m. have been recorded, as well as a variety of habitats, such as open forest, thickets, scrub, dry slopes, open country, etc. The species is a shrub or small tree up to 7 m. in height, with pinkish to dark red peduncles, rachises, and pedicels, white or greenish white petals and stamens, and white carpels which become deep red during development and in fruit. A recorded local name is *vota* (Smith 6813). The type is an Exploring Expedition specimen from Mbua Bay [Sandalwood Bay], Vanua Levu, cited below.

FIJI: VITI LEVU: Mba: Mountains near Lautoka, Greenwood 230 (K), 384 (A, K), 401 (K); vicinity of Nandarivatu, Gibbs 594 (BM type of *W. rhodogyne*, K), *im Thurn* 73 (BM, K), Mead 1989 (K), Gillespie 4035 (Bish, GH, K, NY), 4233 (Bish, GH, K), Degener & Ordenez 13599 (A, Bish, K, NY), Degener 14379 (A, Bish, K, NY, US), Smith 5052 (A, US), Vaughan 3228 (BM); slopes and ridges of Mt. Nanggaranambuluta [Lomalangi], east of Nandarivatu, Gillespie 4333 (Bish, GH, NY), 4071.1 (Bish), Smith 5739 (A, US); Nandronga & Navosa: Southern slopes of Nausori Highlands, in drainage of Namosi Creek above Tumbenasolo, Smith 4710 (A, US). VANUA LEVU: Mbua: H. B. R. Parham, Jan. 3, 1937 (A, BM); Mbua Bay, U. S. Expl. Exped. (GH, K, NY, US 48071 TYPE); Ndama, B. E. Parham & M. Sealolo 2277 (A); Wairiki, B. E. Parham 1122 (A); Mathuata: Seang-gangga Plateau, in drainage of Korovuli River, vicinity of Natua, Smith 6813 (A, US). TAVEUNI: Above Somosomo, Gillespie 4837 (Bish, GH). Fiji, without definite locality: Storck, June 1883 (BM, K), 25 (GH), Horne 1097 (K).

Although *W. richii* is the most abundant species of the genus in Fiji, it does not seem widely dispersed throughout the group, and in my observation it is nowhere abundant; even at Nandarivatu, where many collectors have obtained it, it is not a conspicuous element of the vegetation. As here delimited, *W. richii* is readily distinguished from its closest relative, *W. vitiensis*, by its suborbicular stipules, proportionately broader leaflets, somewhat smaller flowers, and persistent perianth.

The characters utilized by Gibbs to separate *W. rhodogyne* from *W. richii* are seen to be inconsequential when a series of specimens is examined. It is true that the branchlets and leaves of the type of *W. rhodogyne* are glabrous, whereas in the type of *W. richii* the young branchlets, as well as the petiole, leaf-rachis, and costae of the leaflets beneath are setulose-puberulent. However, every stage between these conditions is to be found, even among plants from the vicinity of Nandarivatu, the type

locality of *W. rhodogyne*. Stipules of the two type specimens are similar in shape, those of *W. rhodogyne* being much the smaller, but this appears to be a matter of stage of development, as on other specimens stipules are to be seen varying in diameter from about 2 to 15 mm., often on the same plant. Differences in size of sepals and petals are inconsequential, and filament-length seems to be a matter of state of development of the flower. The ovary is similarly pilose in both concepts. Number of leaflets cannot be utilized to divide the series of specimens cited above. In the type of *W. richii* the leaflets vary between 3 and 9, whereas they seem to be always 3 on Gibbs' type. Other material shows the entire range in this character, and occasionally even unifoliate leaves are found. In general, it can only be stated that the type of *W. rhodogyne* and much of the other material from the Nandarivatu region is comparatively delicate and inclines to be less pubescent than typical specimens of *W. richii* from the drier regions of leeward Vanua Levu. No reasonable means has been found to separate *W. rhodogyne* from the older concept, even varietally.

5. *Weinmannia vitiensis* Seem. Fl. Vit. 110. 1865; Pampan. in Ann. di Bot. 2: 93. 1905.

*Weinmannia affinis* var.  $\beta$  A. Gray, Bot. U. S. Expl. Exped. 1: 674. 1854; C. Muell. in Walp. Ann. Bot. Syst. 5: 30. 1858; Engl. in Linnaea 36: 649. 1870.

Shrub or small tree, the young parts and branchlets strigose-puberulent or strigilllose with whitish hairs 0.1–0.5 mm. long, soon glabrate; stipules chartaceous, oblong or narrowly elliptic,  $3-10 \times 1.5-5$  mm., rounded or obtuse at apex, sparsely puberulent without or glabrate, strigose-tufted in axils; leaves 3-foliate (as far as seen), the petioles 4–18 mm. long, glabrous, often narrowly winged distally, the petiolules winged nearly to base (in lateral leaflets essentially none or up to 7 mm. long, slightly longer in terminal leaflets), the blades subcoriaceous, lanceolate or lanceolate-elliptic, (2.5–) 3–5.5 cm. long, 1–2 cm. broad (terminal sometimes up to  $7.5 \times 2.8$  cm.), attenuate at base and decurrent, obtuse or obtusely cuspidate at apex, crenulate with about 3 crenations per centimeter, glabrous on both sides, the secondary nerves 6–12 per side, with the veinlet-reticulation sharply prominulous on both sides, or the veinlets nearly plane; racemes ternate at apices of peduncles (these very short and insignificant or up to 2 cm. long) or perhaps sometimes solitary, the peduncle, rachis, and pedicels strigose-puberulent like young branchlets, at length glabrate, the racemes 4–7 cm. long; flowers scattered or subfasciculate in groups of 2–4, subtended by caducous oblong bracts up to 1 mm. long, the pedicels slender, about 1 mm. long at anthesis and up to 2 mm. long in fruit; sepals oblong,  $1-1.2 \times 0.7-0.8$  mm., rounded at apex, glabrous; petals oblong,  $1.4-1.6 \times 0.8-1$  mm., rounded at apex; disk-lobes 0.5–0.6 mm. long; stamens with filiform filaments up to 1.7 mm. long, the anthers about 0.3 mm. in diameter; carpels ovoid, sparsely strigose, the styles at anthesis less than 1 mm. long, the ovules 4 per locule in  $\sigma$



flowers; calyx and petals caducous in fruit, leaving a flattened receptacle; capsules narrowly ellipsoid, 3–3.5 mm. long, sparsely puberulent or soon glabrate, the styles up to 1 mm. long; seeds narrowly ellipsoid, about 0.8 mm. long, comate at both ends, the hairs 0.5–1 mm. long, with obscure cross-walls.

**DISTRIBUTION:** Endemic to Fiji, thus far known from three of the smaller islands but to be expected elsewhere in the group. The species occurs at elevations up to 400 m., from the scanty data thus far available, in dense forest or in open places as a compact shrub or tree up to 8 m. in height. The petals and filaments are white and the mature capsules brown. On Moala I recorded the local name as *molau ndamu*.

**FIJI:** KANDAVU: *Seemann 199* (GH, K TYPE). OVALAU: *U. S. Expl. Exped.* (source of the reference to *W. affinis* var.  $\beta$ , GH, NY). MOALA: Summit ridge, *Bryan 317* (Bish); Ndelaïmoala, *Smith 1354* (Bish, GH, K, NY, US). Fiji, without definite locality: *Harvey* (GH, K).

This apparently uncommon species is distinguished from *W. richii* by characters pertaining to stipules, foliage, and perianth, as noted above. The species is one of the conspicuous elements in the rather dry, low forest and open scrub on the island of Moala, but I have not personally observed it elsewhere.

6. *Weinmannia samoensis* A. Gray, Bot. U. S. Expl. Exped. 1: 677. 1854; C. Muell. in Walp. Ann. Bot. Syst. 5: 30. 1858; Engl. in Linnaea 36: 647. 1870; Reinecke in Bot. Jahrb. 25: 634. 1898; Pampan. in Ann. di Bot. 2: 92. 1905; Rechinger in Denkschr. Akad. Wiss. Wien 85: 286. 1910; Setchell in Carnegie Inst. Publ. 341: 92. 1924; Christophersen in Bishop Mus. Bull. 154: 11. 1938.

*Weinmannia samoensis* f. *glabrescens* Pampan. in Ann. di Bot. 2: 92. 1905.

Shrub or small tree, the branchlets hispidulous-puberulent with hairs 0.1–0.7 mm. long, at length glabrate; stipules elliptic or lanceolate-elliptic, 5–15  $\times$  3.5–10 mm., entire, rounded or obtuse at apex, sparsely puberulent and glabrate; leaves 3–7-foliolate (rarely 9-foliolate, very rarely simple), the petioles (1–) 1.5–4 (rarely to 6) cm. long, at first hispidulous, soon glabrate, the rachis similar, usually narrowly winged in distal internode, the petiolules essentially none in lateral leaflets, 3–8 (–13) mm. long in terminal leaflets, winged nearly to base and sometimes hispidulous; leaflet-blades chartaceous, lanceolate, (3–) 4–9 (–12) cm. long, (0.7–) 1–2.5 cm. broad, attenuate at base and decurrent (lateral leaflets with lower basal margin obtuse or narrowly rounded), narrowed to an acuminate or obtusely cuspidate apex, crenulate with 2 or 3 crenations per centimeter, glabrous except the costa sometimes hispidulous like petiole, the secondary nerves 8–14 per side, short, prominulous on both surfaces, the veinlet-reticulation immersed or faintly prominulous; racemes usually ternate (sometimes paired) at apex of peduncles, a subsidiary pair sometimes arising from a lower node of inflorescence-rachis, the peduncle 1.5–2.5 cm. long, like the rachis and pedicels puberulent, even-

tually glabrate, the racemes 5–8 cm. long; flowers mostly single on the rachis, on pedicels 1.5–2.3 mm. long; sepals deltoid-oblong, 0.8–1  $\times$  0.5–0.7 mm., subacute, sometimes faintly puberulent without; petals membranaceous, oblong-ovate, 1.1–1.5  $\times$  0.7–1 mm., rounded at apex; disk-lobes elongate, 0.4–0.7 mm. long; stamens with filiform filaments 2–3 mm. long (in  $\delta$  flowers) or up to 1.5 mm. long (in  $\varnothing$  flowers), the anthers about 0.4 mm. in diameter; carpels ovoid, faintly hispidulous-puberulent, glabrate, the styles up to 1.2 mm. long (in  $\varnothing$  flowers) or shorter (in  $\delta$  flowers), the ovules 8–10 per locule in  $\varnothing$  flowers, undeveloped in  $\delta$  flowers; calyx and petals caducous in fruit, the receptacle flattened; capsule ellipsoid, 2.5–3 mm. long, puberulent like rachis but soon glabrate; seeds narrowly ellipsoid, 0.6–0.7 mm. long, comate at both ends, the hairs usually about 0.7 mm. long.

DISTRIBUTION: Samoa, recorded from the three large islands at elevations of 300–1000 m. The species is said to be a shrub or tree 2–6 m. in height; habitat data are sparse, but Christophersen describes it as growing on lava fields and on river-banks. The type is an Exploring Expedition specimen from Tutuila, cited below. Additional collections were cited by Reinecke and Rechinger.

SAMOA: SAVAI: Central region, *Reinecke* 538 (BM, K, US); Asana, back of Sologa, *Vaupel* 373 (Bish, K, NY, US); Matavanu lava field, *Christophersen & Hume* 1943 (Bish); above Sili, *Christophersen* 3163 (Bish, US). UPOLU: Above Vailele, *Reinecke* 567 (Bish). TUTUILA: *U. S. Expl. Exped.* (GH, K, US 48072 TYPE). Samoa, without definite locality: *Whitmee* 218 (K), *Powell* (GH), 323 (K).

*Weinmannia samoensis*, a species characterized by its narrow lanceolate leaflet-blades, is distinguished from the preceding, *W. vitiensis*, by the greater number of ovules. This character, being observable only in pistillate flowers, is not very practical but nevertheless seems dependable in the material at hand. The difference in the base of the lateral leaflets, utilized in my key, also seems fairly constant. It is not always easy to separate specimens of *W. samoensis* and *W. manuana*, the only other described Samoan species, when the latter has 3-foliolate leaves. In general the leaves of *W. samoensis* are 5–7-foliolate and those of *W. manuana* are simple; when 3-foliolate leaves occur on Samoan plants they are also accompanied by one or the other more characteristic type, in my observation. Nevertheless this character is not entirely satisfactory and must be supplemented by the shape of the leaflet-blades, which are somewhat broader in *W. manuana*. I find no consistent differences between the two species in indument or inflorescence.

Pampanini's forma *glabrescens* is based upon *Reinecke* 502, 538, and 567. Two of these numbers have been examined and I do not observe any reason to separate them from the population as a whole.

## 7. *Weinmannia exigua* sp. nov.

Frutex, partibus novellis copiose cinereo-strigoso-puberulis, ramulis superne subcomplanatis et puberulis demum teretibus glabratis; stipulis

chartaceis suborbicularibus 2–4 mm. diametro, dorso copiose strigosis, margine valde revolutis, caducis, basi intus strigoso-barbellatis; foliis apices ramulorum versus congestis 3- vel 5-foliolatis raro simplicibus vel 7-foliolatis, petiolis 4–9 mm. longis (vel 2–4 mm. in foliis simplicibus) superne anguste alatis, rhachi etiam anguste alata ut petiolulis puberula, petiolulis lateralibus subnullis terminalibus 1–4 mm. longis alatis, laminis chartaceis in sicco fuscis anguste ellipticis, (5–) 8–16 mm. longis, 3–6 mm. latis, basi (lateralibus) obtusis vel (terminalibus) attenuatis, apice obtusis vel obtuse cuspidatis, margine dentibus utrinsecus 3–6 crenatis, supra glabris, subtus praecipue costa pilis 0.2–0.3 mm. longis strigoso-puberulis demum subglabratibus, costa supra subplana subtus elevata, nervis secundariis utrinsecus 3–6 inconspicuis subtus prominulis, rete venularum saepe immerso; racemis summo pedicelli brevis (ad 5 mm. longi) 2 vel 3 vel videtur solitariis 2–3 cm. longis, pedunculo ut rhachi pedicellisque minute puberulo; pedicellis sub anthesi 1–1.5 mm. longis; sepalis 4 subliberis papyraceis oblongis, 0.7–0.8 mm. longis, 0.4–0.5 mm. latis, apice obtusis, superne obscure ciliolatis; petalis 4 membranaceis obovatis, 1.2–1.3 mm. longis, 0.6–0.7 mm. latis, apice rotundatis, basi angustatis; disci lobis 8 oblongis 0.3–0.4 mm. longis apice truncatis; staminibus 8, in floribus ♂ filamentis filiformibus 1.2–1.5 mm. longis, antheris circiter 0.3 mm. diametro; carpellis ovoideis sub anthesi 1–1.5 mm. longis, pilis pallidis 0.2–0.3 mm. longis copiose hirtellis, stylis erectis circiter 1.5 mm. longis, ovulis 3–6 per loculo; perianthio videtur caduco; capsulis ellipsoideis circiter 3 mm. longis glabratibus, seminibus ellipsoideis 0.6–0.7 mm. longis utroque conspicue comatis, pilis stramineis circiter 1.5 mm. longis.

DISTRIBUTION: Fiji, known only from the type collection.

FIJI: VANUA LEVU: Thakaundrove or Mathuata: Between Waiwai and Lomaloma, May 1878, *Horne 632* (K TYPE) (large shrub about 3 m. high, on top of the mountains).

The very distinct entity here described differs from other species of the region in its very small leaves and compact inflorescences.

### Weinmannia sp.

*Weinmannia richii* (?) sensu Christophersen in Bishop Mus. Bull. 154: 11. 1938; non A. Gray.

SAMOA: SAVAI: Tuisivi Range; alt. 1600–1700 m., *Christophersen 787* (Bish, NY); above Matavanu, alt. about 1600 m., *Christophersen 2561* (Bish); rim of Papafu crater, alt. 1500 m., *Christophersen 2735* (Bish).

Although the cited specimens are sterile, they apparently do not represent either known Samoan species, *W. samoensis* or *W. manuana*, unless juvenile forms in this alliance are extremely variable. Although these specimens bear a general resemblance to *W. richii*, I see no reason to refer them here on the basis of present material; the sterile Samoan specimens are inclined to have crenulate stipules and longer petiole-indument, although they do not agree too well among themselves. These collections



suggest that an undescribed species is present on Savaii, unless they are extreme juvenile variants.

A sterile specimen from Upolu (above Saluafata, ridge to Maunga Tele, alt. 830 m., *Christophersen 534* [Bish, US]) cannot be placed at present; it is neither precisely like the Savaii specimens mentioned above nor does it seem to represent either *W. samoensis* or *W. manuana*.

### 3. SPIRAEANTHEMUM A. Gray

*Spiraeanthemum* was described by Gray (Bot. U. S. Expl. Exped. 1: 666. 1854) on the basis of two species, one Samoan and one Fijian. Although these two species have been taken as congeneric by subsequent students, and although in my opinion this is a reasonable interpretation, it is possible they will eventually be placed in at least different sections or perhaps subgenera. I do not find that anyone has made the selection of a genotype, and therefore I should like so to designate *S. samoense*, Gray's first species and the one which in basic characters seems best to agree with the greater number of subsequently described species of *Spiraeanthemum*.

Approximately 27 binomials have thus far been proposed in *Spiraeanthemum*, which has a range from New Guinea, Australia, and New Caledonia to Samoa; it is evidently lacking in Tonga. Like so many of the genera first described from Fiji or Polynesia, *Spiraeanthemum* proves to have its center of distribution in New Guinea and New Caledonia; from the former island eight species are discussed by L. M. Perry (in Jour. Arnold Arb. 30: 139-143. 1949). In our area five species are discernible, four from Fiji and one from Samoa. Although individuals of the genus are seen fairly frequently in Fiji and Samoa, for the most part they occur singly and do not form a striking feature of the vegetation. A common name for the genus in Fiji is *katakata*.

*Spiraeanthemum vitiense* differs markedly from the other species of our region in its verticillate leaves, short stipule-scars, solitary ovules, and seeds with a distal wing only; the remaining species have opposite leaves, elongate and curved stipule-scars, paired ovules, and seeds winged at both ends. Usable characters to differentiate the species are found in the type of indument, leaf-margins, stipule-shape and indument, etc. In general these characters are not strong, but they seem more adequate than those one is forced to utilize in *Weinmannia*. All of our species are probably dioecious, the staminate flowers lacking carpels and the pistillate flowers having probably sterile anthers; it is possible, however, that these anthers are sometimes fertile and the species thus occasionally polygamo-dioecious.

#### KEY TO THE SPECIES

Leaves verticillate; stipules leaving inconspicuous, transversely elliptic, nearly straight scars; leaf-blades obovate-elliptic, rounded or broadly obtuse at apex, the secondary nerves 4-6 per side; inflorescence 2-6 cm. long, the branches usually ternate; carpels 1-ovulate, the seed with a distal wing only, the nucellus basal; Fiji. . . . . 1. *S. vitiense*.

Leaves opposite; stipules leaving curved, elongate scars; leaf-blades lanceolate to ovate- or elliptic-oblong, acuminate or cuspidate or callose-apiculate at apex, the secondary nerves 5-11 per side; inflorescence 5-17 cm. long, the branches opposite or subopposite; carpels 2-ovulate, the seeds with distal and basal wings, the nucellus median.

Branchlets and petioles glabrous or distally evanescently strigose-puberulent, the leaf-blades glabrous on both surfaces (rarely sparsely puberulent on costa when young); Fijian species.

Leaf-blades usually less than twice as long as broad, obtuse at base and abruptly decurrent on the petiole, entire or inconspicuously serrulate at margin, the teeth obsolete or 1 or 2 per centimeter; peduncle of inflorescence usually more than 4 cm. long. . . . . 2. *S. graeffei*.

Leaf-blades usually more than twice as long as broad, attenuate to acute at base and long-decurrent on the petiole, conspicuously serrate at margin with 3 or 4 teeth per centimeter; peduncle of inflorescence less than 4 cm. long. . . . . 3. *S. serratum*.

Branchlets and petioles copiously velutinous-puberulent or hispidulous, tardily glabrate, the leaf-blades puberulent or strigillose at least on costa and secondaries beneath, the indument persistent.

Indument of branchlets and petioles velutinous-puberulent (hairs 0.1-0.15 mm. long, very dense, long-persistent); stipules oblong-ovate, up to  $15 \times 10$  mm., velutinous-puberulent or sericeous on both surfaces; leaf-blades entire or inconspicuously denticulate, the costa and secondaries minutely puberulent beneath (hairs scarcely 0.1 mm. long); ultimate branchlets of inflorescence (below pedicel-articulation) insignificant or to 0.6 mm. long; disk-lobes usually obviously setulose at apex; Fiji. . . . . 4. *S. katakata*.

Indument of branchlets and petioles hispidulous (hairs 0.3-1 mm. long); stipules lanceolate-oblong, comparatively narrow, up to  $35 \times 10$  mm., sericeous or hispidulous without, glabrous within; leaf-blades conspicuously serrulate with 2-4 teeth per centimeter, the costa and secondaries strigose-puberulent beneath (hairs 0.2-0.7 mm. long); ultimate branchlets of inflorescence (below pedicel-articulation) 0.7-2.5 mm. long; disk-lobes sparsely hispidulous or glabrous; Samoa. . . . . 5. *S. samoense*.

1. *Spiraeanthemum vitiense* A. Gray, Bot. U. S. Expl. Exped. 1: 669. *pl.* 83, *B.* 1854, in *Ann. Sci. Nat.* IV. Bot. 4: 177. 1855, in *Proc. Am. Acad.* 3: 128. 1857; C. Muell. in *Walp. Ann. Bot. Syst.* 5: 24. 1858; Seem. *Fl. Vit.* 111. 1865; Gibbs in *Jour. Linn. Soc. Bot.* 39: 144. 1909.

Shrub or small tree, up to 3 m. high, presumably dioecious or possibly polygamo-dioecious, the branchlets terete, glabrous, the young parts obscurely glandular; very young stipules ovate, glabrous and obscurely glandular, soon caducous, the scars inconspicuous, transversely elliptic, nearly straight; leaves verticillate, in threes or fours (rarely in fives), the petioles shallowly canaliculate or semiterete, 4-20 (-23) mm. long, glabrous or obscurely glandular, distally winged; leaf-blades coriaceous, obovate-elliptic, 4-8 (-10.5) cm. long, 1.5-4.5 (-5) cm. broad, acute to attenuate at base and long-decurrent on the petiole, rounded or broadly obtuse at apex, narrowly recurved and entire at margin, glabrous, the costa

slightly elevated above and prominent beneath, the secondary nerves 4–6 per side, arcuate-ascending, usually nearly plane above and elevated beneath, often with inconspicuous domatia in the axils beneath, the veinlet-reticulation intricate, usually plane or immersed above and prominulous beneath; inflorescence paniculate, axillary, solitary, compact, many-flowered, 2–6 cm. long and nearly as broad, the peduncle slender, 7–16 mm. long, very minutely puberulent and soon glabrate, the branches usually ternately arranged, more obviously puberulent than peduncle but subglabrate, the bracts lanceolate-oblong or subfoliaceous, up to 7 mm. long or even approximating leaves in size, soon glabrate, the ultimate bracteoles minute, 0.2–0.3 mm. long; ♂ flowers not seen; ♀ (or perhaps ♂) flowers in clusters of 2–6, each actually solitary at apex of a minute (0.1–0.5 mm. long) ultimate branchlet, the pedicels (above articulation) 0.5–1 mm. long (to 2.3 mm. long in fruit), minutely puberulent, glabrate; calyx 1.2–1.5 mm. long, glabrous or very sparsely puberulent without, deeply 4-lobed (rarely 5- or 6-lobed), the lobes ovate, 0.7–1 mm. broad, subacute; stamens 8 (rarely 10 or 12), the filaments glabrous or very sparsely pale-pilose, 0.7–1.5 mm. long, the anthers broadly ellipsoid, 0.2–0.4 mm. long, dubiously functional; disk-lobes 8 (rarely 10 or 12), free or rarely a pair connate, carnose, angular-obovoid, 0.3–0.4 mm. long, truncate at apex, glabrous; carpels 4 (rarely 5 or 6), ovoid, faintly sericeous, the style 0.7–1.2 mm. long, the ovule solitary, pendulous from near middle; calyx and stamens persistent in fruit, some carpels often aborting; mature carpels ovoid, 2.2–3 mm. long, sparsely hirtellous (hairs 0.1–0.2 mm. long) or essentially glabrate, the style persistent; seed solitary, oblong, 2–2.5 mm. long, 0.8–1 mm. broad, the nucellus ellipsoid, exceeded distally by a wing 0.8–1.2 mm. long, this rounded at apex, the basal wing lacking.

**DISTRIBUTION:** Endemic to Fiji and apparently infrequent, known only from Viti Levu and Vanua Levu, at elevations of 450–1200 m. The species has been noted as a shrub or small tree, up to 3 m. in height, growing in open or ridge-scrub (Parham) or in a forest clearing (Gibbs). The type is an Exploring Expedition collection, cited below, apparently obtained from two localities, Sandalwood Bay [Mbua Bay] and Mathuata, Vanua Levu.

**FIJI:** VITI LEVU: *Graeffe* 16 in part (BM, K); M b a : Tholo-i-Nandarivatu, *Gibbs* 732 (BM); N a m o s i : Summit of Mt. Voma, *B. E. Parham* 1743 (A), 1910 (A). VANUA LEVU: M b u a and M a t h u a t a : Mbua Bay (part) and presumably Mathuata coast (part), *U. S. Expl. Exped.* (GH, K, NY, US 47621 TYPE). Fiji, without definite locality: *Horne* 759 (GH, K), 1104 (K), 1113 (K).

As indicated in my key and generic discussion, *S. vitiense* is a strikingly distinct species both in vegetative features and in the more fundamental characters of the ovulation and seed-shape.

2. *Spiraeanthemum graeffei* Seem. Fl. Vit. 111. 1865; Gibbs in Jour. Linn. Soc. Bot. 39: 145. 1909.

Shrub or tree up to 6 m. high, dioecious, the branchlets slender, glabrous or the youngest parts very obscurely strigillose-puberulent; very young



stipules ovate and dorsally sericeous, the older ones oblong or ovate-oblong, up to 22 mm. long and 10 mm. broad, obtuse, very sparsely strigose-puberulent on both surfaces or glabrate, soon caducous, the scars elongate, curved; leaves opposite, the petioles semiterete, 1–3 cm. long, glabrous, distally winged; leaf-blades coriaceous or subcoriaceous, lanceolate or ovate-elliptic, 5–10 cm. long, (2–) 2.5–6 cm. broad, obtuse at base and abruptly decurrent on the petiole, acuminate or obtusely cuspidate at apex, entire or inconspicuously serrulate at margin (teeth minute, callose-glandular, 1 or 2 per centimeter, or obsolete), glabrous on both surfaces, sometimes with inconspicuous axillary domatia on lower surface, the costa nearly plane above and prominent beneath, the secondary nerves 5–9 per side, arcuate-ascending, plane above, elevated beneath, the veinlet-reticulation intricate, prominulous on both surfaces; inflorescence paniculate, solitary, axillary, ample, many-flowered, 6–15 cm. long and nearly as broad, the peduncle slender, glabrous, (1–) 4–7 cm. long, the branches opposite or subopposite, very sparsely puberulent with hairs about 0.1 mm. long, often glabrate, the bracts oblong or lanceolate, up to 7 mm. long, essentially glabrous, the ultimate bracteoles about 0.5 mm. long; flowers solitary at apices of short ultimate branchlets (0.2–1.5 mm. long), the pedicels (above articulation) 0.5–1.5 mm. long, essentially glabrous; calyx subcarnose, 1.5–2.2 mm. long, deeply 4-lobed, the lobes  $1-1.3 \times 0.7-1$  mm., subacute; stamens 8, the filaments glabrous, in ♂ flowers 2.5–3 mm. long, in ♀ flowers 0.8–1.3 mm. long, the anthers broadly ellipsoid, in ♂ flowers about 0.4 mm. long, in ♀ flowers minute and apparently sterile; disk-lobes in ♂ flowers 4, obovoid-angled, 0.4–0.6 mm. long, free or loosely connate, truncate or often emarginate at apex and hispidulous there and ventrally with hairs 0.3–0.4 mm. long; disk-lobes in ♀ flowers 8, essentially similar but sometimes more obscurely setulose or strictly glabrous; carpels in ♀ flowers 4, ovoid, copiously sericeous-puberulent (hairs 0.1–0.2 mm. long), the style 0.3–0.5 mm. long, the ovules 2, collateral, narrowed at both ends; calyx and stamens persistent in fruit; mature carpels (1 or more sometimes aborted) elongate-ovoid, 3.5–4 mm. long, 0.7–1 mm. broad, persistently pilose, the style persistent; seeds 2, collateral, 2.5–3 mm. long, the nucellus ellipsoid, about 1 mm. long, the wings subequal in length, the distal wing lanceolate, slightly narrower than nucellus, the basal wing subulate.

**DISTRIBUTION:** Endemic to Fiji, apparently infrequent, now known from Viti Levu and Kandavu at elevations of 870–1050 m. The species is reported as a shrub or tree, up to 6 m. in height, occurring in dense forest or in forest-clearings; the calyx and filaments are white and the anthers yellow. Recorded local names are *katakata* (Smith) and *kutakuta* (Gillespie). The type, collected by Graeffe on Kandavu, is cited below.

**FII:** VITI LEVU: Mba: Tholo-i-Nandarivatu ridge, *Gibbs 731* (BM); Naitasiri: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi and Nasonggo, *Smith 5800* (A, US); Namosi: Summit of Mt. Voma, *Gillespie 2728* (Bish, GH, K, NY, US). KANDAVU: Mt. Mbuke Levu, *Graeffe 16* in part (BM, K TYPE).

*Spiraeanthemum graeffei* and *S. serratum* are readily distinguished from *S. katakata* by their usually strictly glabrous branchlets and leaves, these parts bearing a long-persistent velutinous-puberulent indument in *S. katakata*. Characters pertaining to the indument seem much more reliable here than in the genus *Weinmannia*.

3. *Spiraeanthemum serratum* Gillespie in Bishop Mus. Bull. 83: 11. fig. 11. 1931.

Small tree, up to 4 m. high, dioecious, the branchlets slender, glabrous or distally strigose-puberulent (hairs pale, 0.1–0.2 mm. long); very young stipules ovate, obtuse, copiously sericeous dorsally, glabrate, the scars conspicuous, curved; leaves opposite, the petioles semiterete, 1–2 cm. long, glabrous or faintly puberulent like young branchlets, distally winged; leaf-blades subcoriaceous, lanceolate- or oblong-ovate, 4–8 cm. long, 1.3–3.8 cm. broad, attenuate or acute at base and long-decurrent on the petiole, gradually acuminate or obtusely cuspidate at apex, conspicuously serrate at margin (teeth callose-glandular, 3 or 4 per centimeter), glabrous on both surfaces or sparsely puberulent on costa, sometimes with axillary domatia on lower surface, the costa slightly elevated above and prominent beneath, the secondary nerves 6–10 per side, subascending or arcuate, plane above, slightly elevated beneath, the veinlet-reticulation intricate, prominulous on both surfaces or subimmersed above; inflorescence paniculate, solitary, axillary or pseudoterminal, ample, many-flowered, 6–12 cm. long and nearly as broad, the peduncle slender, glabrous or faintly puberulent, 2–4 cm. long, the branches opposite or subopposite, the distal portions strigose-puberulent with hairs 0.1–0.3 mm. long, the bracts papyraceous, oblong, about 2 mm. long, soon glabrate, the ultimate bracteoles about 0.5 mm. long; flowers scattered, not fasciculate, solitary at apices of short ultimate branchlets (up to 0.8 mm. long or essentially none), the pedicels (above articulation) 0.6–1 mm. long, glabrous at anthesis; calyx carnose, glabrous, 1.6–2 mm. long, deeply 4- (rarely 5-) lobed, the lobes oblong-ovate, 1.2–1.5  $\times$  0.8–1 mm., obtuse or subacute; stamens 8 (rarely 10), the filaments glabrous, in  $\delta$  flowers 1.2–1.6 mm. long, in  $\eta$  flowers less than 1 mm. long, the anthers ellipsoid, in  $\delta$  flowers 0.3–0.4 mm. long, in  $\eta$  flowers minute and apparently sterile; disk-lobes in  $\delta$  flowers 4–6, carnose, free or loosely connate within stamens, irregularly obovoid, 0.3–0.5 mm. long, truncate or emarginate at apex, glabrous; disk-lobes in  $\eta$  flowers 8 (rarely 10), essentially similar, sometimes sparsely setulose at apex (hairs few, to 0.3 mm. long); carpels in  $\eta$  flowers 4 (rarely 5), ovoid, copiously sericeous (hairs 0.1–0.2 mm. long), the style 0.5–0.7 mm. long, the ovules 2, collateral, falcate, narrowly winged at both ends; mature carpels narrowly ellipsoid, up to 3.5 mm. long and 0.8 mm. broad, sericeous, the style persistent; seeds paired or only 1 developing, lanceolate, 2.5–2.7 mm. long, 0.3–0.5 mm. broad, the nucellus ellipsoid, less than 1 mm. long, the distal and basal wings subequal, very narrow, subacute.

DISTRIBUTION: Fiji, apparently limited to the summits and upper slopes of a few high hills, at elevations of 1100–1323 m., on Viti Levu and Taveuni. The species is recorded as a small tree, up to 4 m. in height, occurring in the dense thickets of high ridges. It is noteworthy that the localities thus far known are the four highest mountains in Fiji. The type, *Gillespie 4107*, is cited below.

FIJI: VITI LEVU: Mba: Mt. Evans Range [presumably Mt. Mbotilamu], *Greenwood 364* (K), *457* (K); summit of Mt. Tomanivi [Mt. Victoria], *Gillespie 4107* (Bish TYPE, GH), *4122.1* (Bish, K, NY); Namosi: Summit ridge of Mt. Korombasambasanga, *B. E. Parham 2200* (A). TAVEUNI: Summit of Uluinalau, *Smith 891* (Bish, GH, K, NY, US).

On the basis of type collections, it would appear that *S. serratum* is very distinct from *S. graeffei*, but actually the suite of specimens now available shows that the two are closely related. Differences in the leaf-margin and the other points mentioned in my key seem to provide adequate grounds for the maintenance of Gillespie's species.

4. *Spiraeanthemum katakata* Seem. in *Bonplandia* 10: 36, nomen. 1862, Fl. Vit. 111. pl. 17. 1865; Pampan. in *Ann. di Bot.* 2: 51. 1905; Gibbs in *Jour. Linn. Soc. Bot.* 39: 145. 1909.

*Spiraeanthemum samoense* sensu Gibbs in *Jour. Linn. Soc. Bot.* 39: 145. 1909; non A. Gray.

*Spiraeanthemum parksii* Gillespie in *Bishop Mus. Bull.* 83: 10. fig. 10. 1931.

Shrub or tree up to 15 m. high, dioecious, the branchlets terete or distally flattened, copiously velutinous-puberulent toward apices with pale spreading hairs 0.1–0.15 mm. long, the older parts cinereous, glabrate; stipules oblong-ovate, rapidly enlarging in size, up to 15 mm. long and 10 mm. broad, obtuse, densely velutinous-puberulent on both surfaces or closely sericeous, soon caducous, the scars elongate, curved; leaves opposite, the petioles semiterete, 0.8–4 cm. long, narrowly winged distally, copiously puberulent like branchlets, tardily glabrate or not; leaf-blades papyraceous or subcoriaceous, ovate to lanceolate- or ovate-elliptic, 4–14 cm. long, 1.5–8.5 cm. broad, rounded to obtuse or rarely acute at base and abruptly decurrent on the petiole, obtusely cuspidate or short-acuminate at apex, narrowly revolute and entire at margins or undulate or inconspicuously denticulate (teeth if present minute, 1–3 per centimeter), obscurely puberulent on costa above, obviously puberulent on costa and secondaries beneath, otherwise glabrous on both surfaces, usually with obvious axillary domatia on lower surface, the costa nearly plane above and prominent beneath, the secondary nerves 5–11 per side, arcuate-spreading, usually plane above and sharply elevated beneath, the veinlet-reticulation intricate, usually slightly prominulous on both surfaces; inflorescence paniculate, solitary, axillary or pseudoterminal, ample, many-flowered, 5–13 cm. long, 4–8 cm. broad, the peduncle slender, 1–4 (–5) cm. long, copiously and persistently puberulent like young branchlets, the branches opposite or subopposite, persistently puberulent and sometimes also hispidulous with pale hairs to 0.5 mm. long, the bracts oblong, papyraceous, to 2.5 mm. long, rarely



larger and subfoliaceous, puberulent on both sides, the ultimate bracteoles about 0.5 mm. long; flowers solitary or in fascicles of 2–5, each actually terminal on a minute ultimate branchlet to 0.6 mm. long or insignificant, the pedicels (above articulation) 0.5–1.4 mm. long, copiously but minutely puberulent; calyx 1.3–1.8 mm. long and broad, sparsely puberulent or glabrate, deeply lobed, the lobes usually 4, rarely 3 or 5, ovate-oblong,  $0.7\text{--}1.2 \times 0.6\text{--}1$  mm., subacute and minutely cucullate; stamens 8 (rarely 6 or 10), the filaments glabrous, in ♂ flowers 2–2.6 mm. long, in ♀ flowers 0.6–1.2 mm. long, the anthers ellipsoid, in ♂ flowers 0.3–0.4 mm. long, in ♀ flowers minute and apparently sterile; disk-lobes in ♂ flowers usually 4 or 5, rarely 3, free or loosely connate, carinose, obovoid-angled, 0.4–0.7 mm. long, irregularly truncate at apex and setulose or crispate-pilose with pale hairs 0.3–0.6 mm. long; disk-lobes in ♀ flowers 8 (rarely 6 or 10), essentially similar, the apical hairs shorter (0.2–0.3 mm. long) or sometimes lacking; carpels in ♀ flowers usually 4, rarely 3 or 5, ovoid, closely sericeous (hairs about 0.1 mm. long), the style 0.5–1 mm. long, the ovules 2, collateral, attached near middle, narrowed and winged at both ends; calyx and stamens persistent in fruit; mature carpels (1 or more sometimes aborted) falcate- or lanceolate-ellipsoid, 2.5–3 mm. long, persistently puberulent, the style persistent; seeds 2, collateral, 2.2–2.8 mm. long, the nucellus ellipsoid, about 0.8 mm. long, the wings subequal in length, the distal wing oblong, the basal wing subulate.

DISTRIBUTION: Fiji, where it appears to be the most abundant species of the genus, although it is known from only a few islands and is nowhere an obvious feature of the vegetation. A wide range has been recorded for altitudinal occurrence (100–1195 m.) and habitat (dense forest, dry forest, open places, forest-grassland transition, dense ridge thickets and forest, etc.). The species is a shrub or tree, sometimes attaining 15 m. in height; the calyx and filaments are white or greenish white, the styles are white often flushed with pink, and the mature carpels are dull pink. The most frequently recorded local name is *katakata*, but other names, some perhaps questionable, are *kutakuta*, *tandalo*, *vurewai*, *rure*, *singasinga*, and (on Vanua Levu) *wakathere*. The type collection is Seemann 196, of which the precise locality is in doubt; in the original description Seemann reports it as Kandavu, but one sheet at Kew with this number is indicated as being from Port Kinnaird (Ovalau) in part and from Namosi (Viti Levu) in part.

FIJI: VITI LEVU: *Milne* 69 (K); M b a : Mt. Evans Range, *Greenwood* 863A (A, Bish, US), 1220 (US); summit of Mt. Koroyanitu, Mt. Evans Range, *Smith* 4192 (A, US); Mt. Evans Range between Mt. Vatuyanitu and Mt. Natondra, *Smith* 4371 (A, US); Mt. Nairoso, Mt. Evans Range, *Smith* 4409 (A, US); Nandarivatu and vicinity, *Gibbs* 673 (BM), *Parks* 20676 (Bish), 20725 (Bish type of *S. parksii*), *Gillespie* 4021 (Bish, GH, K, NY, US), *Tothill* 777 (K), 778 (K), 778a (K), *Sykes* 27 (A), *Greenwood* 863 (A, K, NY, US), *Smith* 4904 (A, US), *Vaughan* 3260 (BM); western slopes of Mt. Nanggarambuluta, *Smith* 4792 (A, US); valley of Nggaliwana Creek, *Smith* 5371 (A, US); western and southern slopes of Mt. Tomanivi, *Smith* 5222 (A, US); Ra : Numbumakita (about 10 miles east of Mt. Tomanivi), *Gibbs* 880 (BM); Nandronga & Navosa : Northern portion of Rairaimatuku Plateau,

between Nandrau and Nanga, *Smith* 5429 (A, US); Namosi: Near Namosi, *Gillespie* 2589 (Bish, GH, NY); Naitasiri: Nakatia, Navuakethe District, *B. E. Parham* 2738 (A). OVALAU: *Milne* 52 (K), 267 (K). VANUA LEVU: Thakaundrove-Mathuata boundary: Crest of Korotini Range, *Smith* 553 (Bish, GH, K, NY, US); Thakaundrove: Natewa Peninsula, hills south of Natewa, *Smith* 1967 (Bish, GH, K, NY, US). Fiji, without definite locality: *Seemann* 196 (Kandavu, Ovalau, or Viti Levu?) (GH, K TYPE), *Horne* 845 (GH, K), 846 (GH, K), 1007 (GH, K).

The very close velutinous-puberulent indument of vegetative parts readily distinguishes *S. katakata*, from the essentially glabrous *S. graeffei* and *S. serratum* on the one hand, and from the hispidulous- or strigose-pubescent *S. samoense* on the other. Gillespie noted the close relationship of his *S. parksii* with *S. katakata*, suggesting as differentiating characters only the thicker, smaller, and more coriaceous leaves. Among the specimens cited above are many which show, on a single plant, variations in these characters covering the extremes of the two type specimens. As I cannot find any consequential points of difference, either in foliage or inflorescence, among the cited specimens, Gillespie's binomial is reduced to synonymy. The prominence and length of the hairs of the disk-lobes, or even their presence or absence, are not correlated with other characters and appear strictly individual in nature.

5. *Spiraeanthemum samoense* A. Gray, Bot. U. S. Expl. Exped. 1: 667. *pl.* 83, A. 1854, in Ann. Sci. Nat. IV. Bot. 4: 177. 1855, in Proc. Am. Acad. 3: 128. 1857; C. Muell. in Walp. Ann. Bot. Syst. 5: 23. 1858; Reinecke in Bot. Jahrb. 25: 633. 1898; Pampan. in Ann. di Bot. 2: 51. 1905; Rechinger in Denkschr. Akad. Wiss. Wien 85: 286. 1910; Setchell in Carnegie Inst. Publ. 341: 92. 1924; Christophersen in Bishop Mus. Bull. 128: 96. 1935.

Shrub or tree up to 8 m. high, dioecious (or possibly sometimes polygamodioecious), the branchlets distally copiously hispidulous with spreading pale brown hairs 0.3–1 mm. long, at length becoming subglabrate; stipules ovate when young, rapidly enlarging, at length lanceolate-oblong, up to 35 mm. long and 10 mm. broad, obtuse, densely or sparsely sericeous or hispidulous without, glabrous within, soon caducous, the scars elongate, curved; leaves opposite, the petioles semiterete, 1–4 cm. long, copiously hispidulous like branchlets, at length subglabrate; leaf-blades subcoriaceous or chartaceous, elliptic- or ovate-oblong, 5–14 (–15) cm. long, 2.5–7 (–7.5) cm. broad, broadly obtuse to acute at base and short-decurrent on the petiole, obtusely cuspidate or callose-apiculate at apex, conspicuously serrulate at margin with 2–4 callose-glandular teeth per centimeter, sparsely strigose-puberulent on both sides (hairs grayish, 0.2–0.7 mm. long), at length glabrate except indument persisting on costa and secondaries beneath, usually with small axillary domatia on lower surface, the costa plane above or elevated in a groove, prominent beneath, the secondary nerves 6–13 per side, arcuate-spreading, usually plane above and strongly elevated beneath, the veinlet-reticulation intricate, plane or immersed

above, prominulous beneath; inflorescence paniculate, solitary, axillary or pseudoterminal, ample, many-flowered, 7–17 cm. long, 3–10 cm. broad, the peduncle subterete or slightly flattened, 1.5–6 cm. long, hispidulous-puberulent with hairs 0.1–0.3 mm. long, the branches opposite, persistently hispidulous (hairs 0.2–0.5 mm. long), the bracts lanceolate, often sub-foliateous, to 15 mm. long, strigose-puberulent on both sides, the ultimate bracteoles about 0.5 mm. long; flowers solitary at apices of ultimate branchlets (these 0.7–2.5 mm. long), the pedicels (above articulation) 0.5–1.8 mm. long, strigose-puberulent, often glabrate; calyx 1.7–2.3 mm. long and broad, proximally puberulent, usually glabrate, the lobes 4 or 5, rarely 6, ovate-deltoid, 1–1.5  $\times$  0.7–1.1 mm., acute; stamens 8 or 10 (or 12?), the filaments glabrous, in ♂ flowers 1.5–3 mm. long, in ♀ flowers 1–1.5 mm. long, the anthers broadly ellipsoid, in ♂ flowers 0.2–0.3 mm. long, in ♀ flowers minute and probably sterile; disk-lobes in ♂ flowers 4–6, carnos, loosely coherent or free, oblong, 0.6–1 mm. long, irregularly truncate at apex, ventrally and apically sparsely hispidulous with hairs 0.2–0.3 mm. long or glabrous; disk-lobes in ♀ flowers 8 or 10 (or 12?), similar but slightly shorter, 0.4–0.7 mm. long; carpels in ♀ flowers 4 or 5 (or 6?), ovoid, densely sericeous with stramineous hairs 0.2–0.4 mm. long, the style 0.5–0.7 mm. long, the ovules 2, collateral, pendulous from near middle; calyx and stamens persistent in fruit; mature carpels narrowly oblong-ellipsoid, up to 3 mm. long and 1 mm. broad, persistently sericeous, the style persistent; seeds 2 (1 often smaller or perhaps aborted), 1.5–2 mm. long, the nucellus ellipsoid, 0.8–1 mm. long, the wings subequal in length (0.3–0.5 mm. long), the distal wing oblong, obtuse, the basal wing subulate.

**DISTRIBUTION:** Endemic to Samoa, where it occurs on at least the larger islands at altitudes of 500–1700 m., being indicated by Christophersen as common at middle and high elevations. It is usually noted as a tree 2–8 m. high, occurring in various types of forest; the flowers are said to be white or yellowish white and fragrant. Recorded local names are *tauli*, *maota mea*, *saitamu*, and *lau matui*. The type is an Exploring Expedition collection, cited below, which Gray cited with a question as being from Tutuila.

**SAMOA:** SAVAI: Above Letui, *Christophersen* 780 (Bish, K); above Safune-Letui, *Christophersen* 819 (A, Bish, US); above Matavanu, *Christophersen & Hume* 1992 (A, Bish, US), 2069 (Bish, K, NY, US), 2131 (Bish, US). UPOLU: Laulii River basin, *Reinecke* 281 (US); above Utumapu, *Rechinger* 1518 (BM, K, US); Lanutoo, *Funk* 113 (BM), *Rechinger* 706 (BM), 1920 (BM, K, US); Malololelei-Lanutoo trail, *Christophersen* 373 (Bish, K, NY), 399 (Bish, US). TUTUILA: Matafao Ridge, *Collarino* (in *Setchell*) 549 (Bish), *Christophersen* 1048 (Bish, NY), 1067 (A, Bish, US); Le Pioa, *Christophersen* 3506 (Bish, K, NY), 3576 (Bish). Samoa, without definite locality: *U. S. Expl. Exped.* (probably from Tutuila) (GH, US 47619 and 47620 TYPE), *Whitmee* (BM, GH), 37 (K), 257 (BM), 957 (K), *Powell* (GH, K, NY), 121 (K).

The single representative of the genus from Samoa is well characterized by the comparatively long indument of its branchlets, lower surface of leaf-costa, etc., by its elongate stipules which are glabrous within, by its serrulate leaf-blades, and by the comparatively elongate ultimate inflorescence-



branchlets. In this, as in other species of the genus, the pedicels might be described as "jointed," but only the portion above the articulation is strictly pedicellary.

#### 4. PULLEA Schlechter

The genus *Pullea*, described in 1914 (in Bot. Jahrb. 52: 164. fig. 9), is now composed of six species, all limited to New Guinea, as discussed by Perry (in Jour. Arnold Arb. 30: 163–165. 1949). The species here described as new indicates the occurrence as far east as Fiji of another Papuanian genus. That so many genera with this distribution have not yet been reported from the Solomons and the New Hebrides can only indicate the sparsely collected nature of those archipelagos.

#### *Pullea perryana* sp. nov.

Arbor ad 6 m. alta, ramulis teretibus vel superne leviter complanatis, glabris vel apices versus obscure strigillosis, inconspicue lenticellatis, nigrescentibus demum cinerascentibus; stipulis subcoriaceis obovato-suborbicularibus vel obovato-ellipticis, (8–) 10–12 mm. longis, (3–) 8–11 mm. latis, basi angustatis, apice rotundatis, margine valde revolutis, utrinque obscure strigoso-puberulis glabratibus, mox caducis, cicatricibus brevibus transverse ellipticis subrectis; foliis oppositis, petiolis crassis semiteretibus vel leviter canaliculatis superne alatis (7–) 10–25 mm. longis parce strigoso-puberulis mox glabratibus, laminis coriaceis in sicco brunnescentibus ellipticis vel lanceolato-ellipticis, (7–) 11–18 cm. longis, (3.5–) 4–9 cm. latis, basi attenuatis et in petiolum longe decurrentibus, apice obtuse cuspidatis (acumine ipso ad 1 cm. longo rotundato), margine grosse undulato-crenatis (dentibus circiter 1 per centimetrum) et anguste revolutis, utrinque glabris, costa valida supra plana vel leviter elevata subtus prominente, nervis secundariis utrinsecus 7–11 arcuato-adscententibus supra subplanis subtus valde elevatis, rete venularum intricato supra subimmerso subtus prominulo vel plano; inflorescentiis axillaribus vel pseudoterminalibus ample paniculatis multifloris, binis vel ternatis superpositis, sub anthesi (3–) 6–11 cm. longis et (2–) 3–7 cm. latis, pedunculo gracili subcomplanato (1.5–) 4–7 cm. longo parce hispidulo (pilis pallidis 0.1–0.2 mm. longis) glabrato, ramulis primariis apice pedunculi 3–7 aggregatis, bracteis primariis subfoliaceis lineari-oblongis ad  $9 \times 2$  mm. puberulis mox caducis, ramulis ut pedunculo minute hispidulo-puberulis; floribus hermaphroditis sessilibus confertis 1-bracteolatis, bracteolis obovatis 1–1.2 mm. longis apice rotundatis extus parce strigillosis intus glabris margine ciliolatis; calyce 2–2.5 mm. longo demum subrotato ad 4 mm. diametro, tubo minute obconico, limbo papyraceo profunde lobato, lobis 5 vel 6 anguste imbricatis oblongo-ellipticis  $1.5\text{--}1.7 \times 1\text{--}1.2$  mm., inconspicue nervatis, extus parce strigilloso-puberulis vel glabratibus, intus dense puberulis, margine ciliolatis, apice rotundatis; petalis nullis; staminibus 10 vel 12 demum deciduis, filamentis gracilibus 2–2.3 mm. longis, antheris ellipsoideis circiter 0.4 mm. longis utroque rotundatis; disci lobis

10 vel 12 carnosus plerumque binatim cohaerentibus oblongo-obovoideis subquadratis 0.3–0.4 mm. longis glabris, apice complanatis vel rotundatis; ovario subsupero, basi in calycis tubo leviter immerso, crispato-tomentello (pilis 0.5–0.7 mm. longis), stylis subulatis curvatis glabris 1.5–2 mm. longis, ovulis in quoque loculo 4 biseriatim pendulis.

DISTRIBUTION: Fiji, known from only two collections, both obtained in southeastern Viti Levu; Parham notes his collection as a tree 6 m. high, growing in ridge forest, with cream-white flowers.

FIJI: VITI LEVU: Naitasiri: Tholo-i-Suva, *B. E. Parham 1646* (A); Rewa or Naitasiri: "Central Road, Suva," November, 1928, *B. H. Tothill 472* (Bish, K TYPE, US).

This remarkable species, so completely unlike anything yet described from Fiji, is most suggestive of the New Guinean *P. decipiens* Perry, from which it differs in its much larger leaves and inflorescences and in having the ovary nearly completely superior, immersed in the calyx-tube only at its base. The New Guinean species seem to have the ovary about half-inferior, but otherwise no basic characters are discerned for segregation of the Fijian plant.

It is a pleasure to name this species for Dr. Lily M. Perry, in recognition of her valuable work on the flora of Papuasias, and with particular reference to her review of the Cunoniaceae (in *Jour. Arnold Arb.* 30: 139–165. 1949). As Dr. Perry first suggested that the new species might be sought in *Pullea*, the epithet seems particularly fitting.

DEPARTMENT OF BOTANY,  
U. S. NATIONAL MUSEUM,  
SMITHSONIAN INSTITUTION.

NOTES ON XANTHOSTEMON F. MUELLER AND  
KJELLBERGIODENDRON BURRET

E. D. MERRILL

GUGERLI'S \* MONOGRAPH OF THE GENUS *Xanthostemon* F. Mueller was published in Germany in 1940 and did not become available to us until about a decade later. My interest in this work is not so much in the New Caledonian species considered, which form the bulk of the described forms, and the few Australian ones, but rather in his treatment of certain Philippine, eastern Malaysian, and Papuan species. He recognized forty-three species and a few subspecies and varieties, distributed into five newly proposed sections, *Vesicaria*, *Brevistyla*, *Cylindrica*, *Bullata*, and *Campanulata*, the latter subdivided into two subsections, *Multiflora* and *Pauciflora*. I do not criticize these minor categories. Like other revisions of its type it has the merit of a proposed system of classification, and of bringing together the widely scattered published data regarding all the species described up to 1940. One judges that perhaps certain obvious errors in nomenclature may be due perhaps more to a lack of critical editorial work on the manuscript than as wholly chargeable to a beginner who was working with a peculiarly difficult group of plants. In nomenclature the author was apparently misled by Pampanini's erroneous interpretation of the rules of nomenclature governing the validity of certain published binomials in 1905. The several cases are discussed under *Xanthostemon speciosum* Merr., *X. pubescens* C. T. White, *X. multiflorum* (Montr.) Beauvisage, and *X. gugerlii* Merr.

*Xanthostemon* is a genus of considerable significance from the standpoint of phytogeography. Its great center of diversification is New Caledonia, with a total of about thirty-three endemic species. Five species are recorded from northern and northeastern Australia, three from New Guinea, four from the Philippines, and one from Celebes (this Celebesian form also extending to Moena, Ternate and Batjan). To date no representative of the genus has been reported from any part of the Sunda or Lesser Sunda Islands, the latter group extending eastward from Java. Incidentally Gugerli's distribution map extends the range of the genus, within the Philippines, to northern Luzon, about 250 miles beyond the known actual range of the Philippine representatives.

One problem, not solved by Dr. Gugerli, as he did not have access to certain historical material, was the status of *Xanthostemon celebicum* Koord. He merely quoted the original distinctly unsatisfactory

\*Gugerli, K. Monographie der Myrtaceengattung *Xanthostemon*. Repert. Sp. Nov. Beih. 10: 1-49. pl. 1-16. 1940. Reprinted without change in pagination as a doctorate thesis, University of Zurich, 1940.



description and left the species as one of the two unknown to him. The large fruits, described as 1.8 cm. long and 1.2 cm. in diameter, might lead one to assume that some genus other than *Xanthostemon* was represented, and this proves to be the case. Koorder's unpublished dissection notes and sketches clearly show that he knew the fruit to be indehiscent and 1-seeded, and that the stamens were arranged in five distinct phalanges; these are not *Xanthostemon* characters. It is unfortunate that he did not include these data in his published description. The species proves to be a representative of the very different *Kjellbergiodendron* Burret. When I initiated this study I had no intention of considering Burret's genus until an examination of material now available indicated that a representative of this genus was involved. Dr. van Steenis informs me that Beccari had recognized, named, and described this striking genus on the basis of his own Celebesian collections at some time previous to 1890. Unfortunately he never published his description. Had he done so his name would have antedated that of Burret by four or five decades and doubtless would have obviated the later Koorders errors.

In the course of this study I have been impressed with the excellent representation of the known species to be found in the herbarium of the Arnold Arboretum. At least two-thirds of the described species are represented by from one to many specimens, and it is of interest to note that many isotypes are to be found here. Most of this material has been acquired within the last fifteen years. I have accounted for both of the described species which Dr. Gugerli could not place, *X. celebicum* Koord. being transferred to *Kjellbergiodendron*, and *X. papuanum* Lauterb. being reduced to *X. novaguineense* Valet. I add *X. crenatus* C. T. White, of New Guinea, described in 1942, and here describe as new *Xanthostemon brassii* Merr. from New Guinea and *X. confertiflorum* Merr. from Celebes. Certain adjustments in nomenclature are also involved for four previously described species, where Dr. Gugerli erred in selecting wrong specific names.

I am indebted to the officials of the Rijksherbarium, Leiden (L), the United States National Herbarium (U), and the Gray Herbarium (G), for the courteous loan of needed material. Except for collections indicated by the above symbolic letters all other material studied is in the Arnold Arboretum Herbarium (A), although before drafting this paper, and after its completion, I had seen the material at Kew and the British Museum.

### **Xanthostemon F. Mueller**

#### NEW CALEDONIA

#### **Xanthostemon gugerlii** nom. nov.

*Xanthostemon speciosum* (Brongn. & Gris) Pamp. Nuovo Giorn. Bot. Ital. II. 12: 688. 1905, in obs.; Gugerli, Repert. Sp. Nov. Beih. 120: 97. 1940; Guillaumin, Fl. Nuov.-Caléd. 233. 1948, non Merr. 1904.

*Fremya speciosa* Brongn. & Gris, Bull. Soc. Bot. France **12**: 299. 1865.

Gugerli in accepting the validity of this New Caledonian species in 1940 adopted the name *Xanthostemon speciosum* (Brongn. & Gris) Niedenzu, but I can find no record of an actual transfer of the specific name to *Xanthostemon* antedating Pampanini's overlooked one of 1905. Even this, when published, was an unnecessary binomial as it was antedated by *X. speciosum* Merr. (1904), which belongs to a very different Philippine species. The only reference given by Gugerli is to Zahlbruckner, Ann. Naturhist. Hofmus. Wien **3**: 279. 1888, but there only the binomial *Fremya speciosa* Brongn. & Gris was used, as is the case in all other references I have found and checked. Of course *Fremya speciosa* Brongn. & Gris (1865) does not invalidate *Xanthostemon speciosum* Merr. (1904). The series of curious errors resulting from Pampanini's misinterpretation of the rules of nomenclature governing the validity of binomials, and perpetuated and expanded by Gugerli in 1940, is further discussed under *Xanthostemon speciosum* Merr., q.v. There is a duplicate of the type collection of this New Caledonian species, *Viellard 2579*, in the Gray Herbarium.

***Xanthostemon multiflorum*** (Montr.) Beauvisage, Ann. Soc. Bot. Lyon **26**: 46. 1901; Pamp. Nuovo Giorn. Bot. Ital. II. **12**: 673. 1905; Guillaumin, Bull. Soc. Bot. France **81**: 14. 1934.

*Draparnaudia multiflora* Montr. Mém. Acad. Lyon, **10**: 205. 1860, sphalm. "*Drapernandia*."

*Fremya pubescens* Brongn. & Gris, Bull. Soc. Bot. France **10**: 373. 1863.

*Xanthostemon pubescens* Pampaloni, Nuovo Giorn. Bot. Ital. II. **13**: 128. 1906; Gugerli, Repert. Sp. Nov. Beih. **120**: 126. 1940; Guillaumin, Fl. Nouv.-Caléd. 234. 1948, non C. T. White (1917).

Gugerli states that *Draparnaudia multiflora* was, in part, *Xanthostemon flavum* (Panch.) Schltr. However, Beauvisage clearly states that there was but one poor specimen in the Lyon herbarium named by Montrouzier as *Draparnaudia multiflora* Montr.; the type collection hence could not have been a mixture. But when Beauvisage drew up a complete description of *Xanthostemon multiflorum* (Montr.) Beauvisage, on the basis of about 20 individual collections, he cited about seven synonyms including not only Montrouzier's original *Draparnaudia*, but also *Fremya flava* Brongn. & Gris, *F. deplanchei* Brongn. & Gris, *F. pubescens* Brongn. & Gris, and *F. elegans* Brongn. & Gris, all published in 1863. Incidentally Montrouzier in 1860 did not prepare and publish an actual species description, other than as such data were included in his generic description, and as he had only one poor specimen there could have been no mixture in his original species concept. But Beauvisage's description of 1901 is definitely of a collective species. Here, then, must be the basis of Gugerli's statement that Montrouzier's species was, in part, *Xanthostemon flavum* (Panch.) Schltr. Yet Pampanini, op. cit. 675, definitely stated that he had seen the Montrouzier type, and on p. 682 repeated the statement. He concluded that this

specimen, admittedly a poor one, was the same as *Fremya pubescens* Brongn. & Gris and cited Montrouzier's binomial in the synonymy of *Xanthostemon multiflorum* (Montr.) Beauvisage, making it *X. multiflorum* (Montr.). Beauvisage, var. *typicum* Pamp., forma *pubescens* (Brongn. & Gris) Pamp. Under the circumstances I do not hesitate to replace Gugerli's invalid binomial *Xanthostemon pubescens* (Brongn. & Gris) Gugerli by the earlier name of Montrouzier. Until by a reexamination of the Montrouzier type it can be proved that Pampanini erred, there seems to be no other choice, unless one wishes to propose a new specific name which I consider to be uncalled for at present. The species is known only from New Caledonia.

***Xanthostemon myrtifolium*** (Brongn. & Gris) Pamp. Nuovo Giorn. Bot. Ital. II. **12**: 682. 1905; Gugerli, Repert. Sp. Nov. Beih. **120**: 68. 1940.

*Fremya myrtifolia* Brongn. & Gris, Bull. Soc. Bot. France **12**: 299. 1865, Ann. Sci. Nat. V. Bot. **3**: 227. 1865.

*Xanthostemon integrifolium* Baker f. Jour. Linn. Soc. Bot. **45**: 311. 1921; Gugerli, op. cit. 58; Guillaumin, Fl. Nouv.-Caléd. 232. 1948, syn. nov.

*Fremya integrifolia* Brongn. & Gris ex Baker, f. l.c. in syn., syn. nov.

Gugerli noted, which Baker f. did not, that *Fremya integrifolia* Brongn. & Gris was an unpublished herbarium name. But Baker f. in transferring it to *Xanthostemon* in 1921 failed to provide a description, although he did publish Compton's field note to the effect that it was a shrub with small hard leaves with thickened margins, white corollas and pale yellow stamens. This Gugerli accepted as a description and with misguided confidence placed the species in his section *Brevistyla* where it does not belong. His judgment must have been based solely on the statement that the flowers were white.

The actual specimen on which the Brongniart and Gris and the Baker f. binomials were based is in the British Museum herbarium, and Baker f. was correct in referring to it *Compton 826*, but erred, as did Gugerli, in so identifying *Compton 375* (cited by Gugerli as Baker 375). The latter is a small-leaved form of *Metrosideros operculata* Labill. Guillaumin Not. Syst. **1**: 109. fig. 5, 1909, concluded that the proposed varieties of this species should be abandoned because of the intergrading forms. The British Museum specimen of *Fremya integrifolia* carried the collector's ample note, but no collector's name or number. I showed this to Dr. Tardieu-Blot, who was at the British Museum for a few days in July, 1951, and on her return to Paris she completed the record. The same field note appears on a New Caledonia collection, *Baudouin 638*; this Paris specimen is identical with the London one, and both match the type of *X. myrtifolium* (Brongn. & Gris) Pamp. Thus another minor mystery is solved, for in 1934 (Bull. Soc. Bot. France **81**: 14) Guillaumin had stated that *Xanthostemon integrifolium* Bak. f. nomen (*Fremya integrifolium* Brongn. et Gris) was totally unknown to him and that it was not represented in the Paris herbarium.



He accepted the species in 1948 solely on the authority of Gugerli. But neither Gugerli, who did not see the British Museum specimen, nor Guillaumin, had any reason to believe that *Baudouin 638*, with which both were familiar, was an isotype of the elusive *Xanthostemon integrifolium* (Brongn. & Gris) Baker f. which now proves to be the case.

### AUSTRALIA

***Xanthostemon whitei*** Gugerli, Repert. Sp. Nov. Beih. **120**: 83. 1940, sphalm. *whitii*.

*Xanthostemon pubescens* C. T. White, Proc. Roy. Soc. Queensl. **28**: 57. 1917; Queensl. Dept. Agr. Bull. **20**: 14. 1918, non Pampaloni, 1906.

The type of this species was from the Atherton and Herberton districts, Queensland, Australia. It is well represented by *Kajewski 1046* (A), May 24, 1929, from Gadgarra, Atherton, not far from the type locality. At first sight one infers that a new name was not needed here. At any rate Gugerli's reason for publishing the new name was invalid as *Fremya pubescens* Brongn. & Gris (1863) did not invalidate *Xanthostemon pubescens* C. T. White (1917); and yet it develops that the new name was needed because of the earlier and still unlisted *Xanthostemon pubescens* Pampaloni (1906) which all authors have overlooked. Gugerli's new specific name was misspelled, he should not have cited C. T. White as the parenthetic author, and the one collection cited by him is not *C. T. White 1046*, but is *S. F. Kajewski 1046*; the identification was by C. T. White.

### NEW GUINEA

***Xanthostemon brassii*** sp. nov. Sect. *Campanulata*, *Multiflora*.

*Xanthostemon paradoxum* sensu C. T. White, Jour. Arnold Arb. **23**: 83. 1942, non F. Muell.

Arbor usque ad 30 m. alta, decidua, inflorescentiis leviter et brevissime adpresso-pubescentibus exceptis glabra, ramulis ultimis rugosis, 4-5 mm. diametro, cicatricibus distinctis ornatis; foliis alternis, subconfertis, coriaceis vel junioribus subchartaceis, ellipticis vel oblongo-ellipticis, sicco brunneis vel pallide olivaceis, 6-15 cm. longis, 3-7 cm. latis, apice plerumque late rotundatis, rariter obscure retusis, junioribus distincte sed adultis obscure glanduloso-punctatis; nervis primariis utrinque circiter 15, irregulariter dispositis, patulo-curvatis, utrinque distinctis, leviter elevatis, arcuato-anastomosantibus sed venam intramarginalem vix formantibus; petiolo 6-14 mm. longo; inflorescentiis pseudoterminalibus, singulis in axillis foliorum vel delapsorum dispositis, totis ad 8 cm. diametro, leviter adpresse breviter pubescentibus, sub fructu glaberrimis, singulis 3-4 cm. longis, breviter (ca. 1 cm.) pedunculatis, 3-5-floris; floribus 5-meris, flavidis, breviter (5-8 mm.) pedicellatis, bracteolis haud visis, ut videtur cite deciduis; calycibus extus leviter pubescentibus, tubo infundibuliforme, circiter 4 mm. longo, 5-6 mm. diametro, intus glabro, lobis orbiculari-ovatis vel

reniformi-ovatis, basi 2–3 mm. latis, sursum vix angustatis, 1.5–2.5 mm. longis, apice late rotundatis; petalis ellipticis, late rotundatis, 4 mm. longis et 3 mm. latis, in partibus medianis obscure glandulosis; staminibus circiter 20, 1-seriatis, filamentis liberis, 1.5–2 cm. longis; antheris ellipsoideis, obtusis, 1.8 mm. longis; ovario glabro 3-loculare, subhemisphaerico; stylo ad 2.5 cm. longo; capsulis globosis, 1 cm. diametro, 3-locularibus, seminibus numerosis, compressis, ambitu subtriangularis, 3–4 mm. longis latisque.

BRITISH NEW GUINEA: type *Brass* 7869 (flowers), 7503 (fruits) taken from the same tree, Lake Daviumbu, Middle Fly River, the flowers September 1, the fruiting specimen August 26 "large tree, 30 m., briefly deciduous, a crop of flowers appearing a few days before the fall of the leaves, flowers yellow." Other specimens are *Brass* 6556, 5932 (both in fruit), common in the savannah forest at Dagwa, Oriomo River, and Mabaduan, Western Division, and *Brass* 8575, Tatara, Wassi Kussi River, abundant on savannah forest ridges, entering the rain forest. The full notes are given by C. T. White, i.e.

C. T. White after examining F. Mueller's apparently not very satisfactory type, from Arnhem Land [Northern Territory], Australia, considered that all of these Papuan collections represented *Xanthostemon paradoxum* F. Muell., *sensu lat.* While I have available only two good specimens representing the Australian species, and one of these (herb. Gray) is an isotype, there are so many differences that I feel justified in describing the New Guinea form as a distinct species. Gugerli, Repert. Sp. Nov. Beih. 120: 81. 1940, provided some additional descriptive data for the Australian form, citing about nine individual collections all from the Northern Territory of Australia. These notes are of such a character that they support my opinion that had he had access to the Brass collections at the time he studied the group, he would have recognized this New Guinea form as a distinct species. As White noted, F. Mueller had two individual collections, these not quite identical, and he based his description on the characters of both. In his original description of 1857 Mueller stated: "In collibus petraeis ad flumina Victoria et Fitzmaurice," these two rivers in the western part of what is now the Northern Territory of Australia. In his amplified description of 1858 Mueller cited only the Victoria River locality. It is this Victoria River collection, represented at Kew and at the Gray Herbarium, that I accept as the type. It has distinctly pubescent leaves, and densely cinereous-pubescent inflorescences, including the outside of the calyces. In this the densely pubescent bracteoles are persistent or at least subsistent. There is in the U. S. National Herbarium another specimen of this pubescent form merely labelled "Schomburgk, North Coast"; this is undoubtedly the Port Darwin collection distributed by Schomburgk, *Schulz* 356 as cited by Gugerli. In addition to these two specimens which have been available to me for comparison, I made notes on the Kew collections of *Mueller*, *Cunningham*, *Basedow*, *Spencer*, and *Stokes*, these also seen by Dr. Gugerli.

The individual 3- to 5-flowered inflorescences in *Xanthostemon brassii* Merr. are associated with mature leaves or often with very young leaves, or occur in the axils of fallen leaves. Taken together they give the impression of a terminal many flowered panicle up to 8 cm. long and wide. These individual inflorescences are associated with the deciduous character of the tree, the flowers apparently commencing to develop with the fall of the old leaves and the almost simultaneous appearance of the new foliage.

**Xanthostemon crenulatum** C. T. White, Jour. Arnold Arb. 23: 82. 1942. Sect. *Campanulata*, subsect. *Multiflora*.

This addition to the species considered by Dr. Gugerli in 1940 was based on *Brass* 5805, 8358, 8473, 8602, all in the Arnold Arboretum herbarium, collected from various parts of British New Guinea in 1934 and in 1936-37. Aside from its almost strictly opposite leaves (described as subopposite), which is an anomalous character in *Xanthostemon*, another striking feature is its unusually small flowers. These were described by Mr. Brass as white and as greenish white. The bracts and bracteoles, not described in the original description, are present but are deciduous, being present in inflorescences with young buds, falling as the flowers open. They are linear-lanceolate, pubescent, and up to 5 mm. long.

This species may better be placed in *Nani* Adanson (*Nania* Miquel) because of its opposite leaves. Adanson's genus, by common consent, is placed as a synonym of *Metrosideros* Banks. Valetton, however, Ic. Bogor. 1: 63, 67, pl. 98, 99. 1901, accepted *Nania* Miq. as generically distinct from *Metrosideros* Banks, recognizing two species, *Nania vera* Miq., and *Nania petiolata* Valetton, calling attention to the fact that the fruits of *Nania* Miq. (= *Nani* Adanson) are entirely free from the calyx (superior), and that the placentas and seeds are quite different from those of *Metrosideros* Banks; I may add that the valves split to the very base, while in *Metrosideros* the fruits are inferior and open by radiately arranged valves across the truncate tops. I had, at first, included certain of these opposite-leaved species in *Xanthostemon* (New Guinea and Amboina), which I have eliminated, since I am now convinced that they do not belong in the latter genus, but really represent species of *Nani* Adanson. Involved here are *Metrosideros vera* Lindl. (1821-24; Roxb. 1832) from Amboina; *M. suberosa* Roxb. (1814, 1832), Moluccas, *Syncarpia vertholenii* Teysm. & Binn. (1855) = *Metrosideros vera* Lindl., and *Nania petiolata* Valetton (1900) (probably from Celebes, not Java). I have not had access to sufficient material to settle the various matters involved, both as to generic and as to specific limits among the taxa above listed.

**Xanthostemon novaguineense** Valetton, Bull. Dép. Agr. Ind. Néerl. 10: [72]. 1907, Ic. Bogor. 3: sub. pl. 239. 1907; Gugerli, Repert. Sp. Nov. 120: 85. 1940.



*Xanthostemon paradoxum* sensu Valetton, Ic. Bogor. 3: 95. pl 239. 1907, non F. Muell.

*Xanthostemon papuanum* Lauterb. Nova Guinea 8: 854. 1910; Gugerli, op. cit. 130, inter sp. dub.; C. T. White, Jour. Arnold Arb. 23: 82. 1942, syn. nov.

All the collections involved in this case were from the Humboldt Bay region, north coast of New Guinea. Valetton's type was from Tobadi, a village on the inner bay, and Lauterbach's type was from the lower slopes of the neighboring Cyclops Mountains. Hollandia is the important town here, and the other localities mentioned are near that place. *Sigafoos* 42 from near Lake Sentano, exactly matches a duplicate of *Wichtman* 125 in the Rijksherbarium, the type collection of Valetton's species and also agrees with the excellent illustration and detailed description of *X. novaguineense* Val., while *Brass* 8801 from Hollandia agrees perfectly with Lauterbach's description of *X. papuanum* Lauterb. and with *Gjellerup* 488, in the Rijksherbarium, the latter being the Lauterbach type collection. The only differences I have been able to detect after a searching comparison are that in the taxon of Valetton the inflorescences are glabrous, and in that of Lauterbach they are somewhat pubescent. The *Sigafoos* note reads, in part, "shrub in the grass savannah on laterite, common 250 to 400 ft., flowers brilliant red. A similar plant observed later was a tree 40 to 60 feet high." The *Brass* note is "common tree 15 to 17 m. in old seral rainforest, abundant as a small tree or shrub on dry forested slopes covered with grass and ferns, flowers red, alt. 20-100 m." It should be noted that the Lauterbach type from the neighboring Cyclops Mountains at 400 m. was from *alang* covered slopes, *alang* being the coarse grass *Imperata*.

Here Dr. Gugerli cleared up the nomenclatural difficulties appertaining to Valetton's erroneous concept of *Xanthostemon paradoxum* F. Muell. After Valetton's detailed description and illustration was in press he apparently saw authentic material of F. Mueller's Australian species, and published his new binomial first in his corrections to his list of Papuan plants in an unnumbered sheet of the Bulletin in Buitenzorg, and a little later in a supplementary unpagged sheet in the Icones which was printed in Holland. Unfortunately Dr. Gugerli did not see Lauterbach's type, and being unable to place the species in his arrangement of them, left it among the few of doubtful status. It is, however, rather strange that he should have expressed the opinion that a species of the Australian genus *Kunzea* Reichb. might be represented. The description is all of *Xanthostemon*, not at all of *Kunzea*, and apparently no *Kunzea* has as yet been found in New Guinea. My conclusion is that the very slight differences between the two supposedly distinct species, i.e., glabrous as opposed to somewhat pubescent inflorescences, are due to local conditions as to exposure, etc., and that but a single valid species is here represented.

## CELEBES

**Xanthostemon confertiflorum** sp. nov. Sect. *Vesicaria*.

Ut videtur arbor vel arbor parva omnino glabra, ramulis ultimis 1.2–2 mm. diametro; foliis numerosis, plus minusve confertis, coriaceis, vix vel obscure punctulatis, plerumque obovatis interdum subellipticis vel subelliptico-obovatis, apice late rotundatis vel rariter subretusis, basi late acutis, breviter (5–8 mm.) petiolatis, sicco subolivaceo-brunneis vel pallide brunneis, opacis vel subnitidis, 4–8 cm. longis, 3–5 cm. latis; nervis primariis utrinque 10–12, gracilibus, vix vel obscure elevatis, haud perspicuis, subtus dense reticulatis; inflorescentiis terminalibus, sessilibus, circiter 3 cm. diametro, floribus confertis, 5-meris, breviter (ad 3 mm.) crasseque pedicellatis; bracteolis binis, anguste oblongis, acutis, coriaceis, glabris, circiter 5 mm. longis et 1.2 mm. latis; calycibus, lobis inclusis, circiter 7 mm. longis, glabris, tubo subpatelliformibus, ad 1 cm. diametro, lobis 5, triangulari-ovatis, coriaceis, deorsum 3–4 mm. latis, sursum angustatis, 3 mm. longis, acutis vel subacuminatis, sub fructu saepe recurvatis; petalis 5, orbicularibus, late rotundatis, 6 mm. diametro; staminibus circiter 30, 1-seriatis, filamentis liberis, immaturis (inflexis) 6 mm., maturis rectis 1.5 cm. longis; stylo ad 2.5 cm. longo; ovario superiore vel semisuperiore, glabro, depresso-globoso, 3-loculare, cellulis multiovulatis; capsulis globosis vel subglobosis, 3-loculatis, punctato-glandulosis, circiter 1 cm. diametro; seminibus numerosis, compressis, obovatis, circiter 3 mm. longis.

CELEBES: Malili and vicinity, *Neth. Ind. For. Serv. Cel. III-103* (A, L), *bb. 18018* (L), *18011* (A), *18672* (A), *21782* (A), *22723* (A); Manado, *bb. 19636* (A, L), *31512* (A).

This series of specimens was collected in 1933, 1934, 1935, and 1939. Only *bb. 19636* is sterile, the others having either flowers or just opening flower buds, or mature fruits. The indicated type is the first cited specimen, although its flowers are not quite mature. The capsule characters were taken from *bb. 18011*, and *bb. 31512*. Notes regarding the plant are lacking except that the altitude is indicated as from 25 to 500 m.; all but one of the specimens (and that a sterile one) were apparently dried out from material originally preserved in alcohol, thus all traces of the flower color are lacking, but the flowers were probably purplish. It is the first true *Xanthostemon* to be discovered in Celebes. I have placed it in the section *Vesicaria* because of its shallow calyces, in spite of the fact that it lacks the five protuberances on the calyx tube, which is one of the characters of that section. It is distinguished from the Philippine *M. speciosum* Merr. (*M. merrillii* Pamp., *M. purpureum* Gugerli), not only by lacking the calyx protuberances but also by its leaves being very obscurely or not at all glandular-punctate.

## PHILIPPINES

**Xanthostemon speciosum** Merr. Govt. Lab. Publ. 6: 10. 1904.

*Xanthostemon merrillii* Pamp. Nuovo Giorn. Bot. Ital. 12: 688. 1905.

*Xanthostemon purpureum* Gugerli, Repert. Sp. Nov. Beih. 120: 53. pl. 15. fig. a. 1940.

This species, Gugerli's description of 1940 having been based on *Merrill 682* from Culion (the type), *Weber 1551* from Busuanga, and *F. B. 29266 Cenabre* from Palawan, is also represented by *F. B. 28902* (A) from Culion, and *Philip. Nat. Herb. 218 Edano* (A), and *12431 Sulit* (A) from Palawan, the first from near Puerto Princesa, the second from the vicinity of Victoria Peak. I have examined specimens of all the numbers cited by Gugerli.

This is the type of section *Vesicaria* Gugerli. The species is distinct from *X. verdugonianum* Naves to which I erroneously reduced it in 1923 (Enum. Philip. Fl. Pl. 3: 183). Gugerli correctly reinstated it as a species in 1940, even if he erred in redescribing it as new, for already two other binomials had been published for it. In nomenclature and in the recognition of species we here have a strange comedy of errors, for Gugerli cites *Merrill 682* from Culion, as the type of *X. purpureum* Gugerli (1940). He said, op. cit. 131-132, that the Kew specimen of this number actually represented *X. verdugonianum* Naves. I have reexamined it and find it, like all other specimens of this number, to be *X. speciosum* Merr., and not the Naves species; Mr. H. K. Airy Shaw later verified this at my request. This now historical *Merrill 682*, all specimens taken by me personally from a single tree in the Cogonal Grande, Culion, Feb. 12, 1902, is thus the basis of *X. speciosum* Merr. (1904), *X. merrillii* Pamp. (1905), and *X. purpureum* Gugerli (1940). There is no possibility of a mixture of material under the number discussed. The holotype was destroyed when the Manila herbarium was burned near the close of World War II at the time of the reoccupation of Manila by American troops. I have examined the duplicate types at Kew, the Gray Herbarium, and the U. S. National Herbarium.

The errors commenced with Pampanini in 1905 who proposed the unnecessary new binomial *X. merrillii* Pamp. because, while he correctly accepted the reduction of *Fremya* Brongn. & Gris to *Xanthostemon* F. Muell., he erroneously concluded that *Fremya speciosa* Brongn. & Gris (1863) invalidated *Xanthostemon speciosum* Merr. (1904), which is utterly contrary to the rules of botanical nomenclature. I continued the error when, without checking the details, I accepted Pampanini's conclusion in 1923 and added to the confusion, thus probably aiding Gugerli in some of his misinterpretations, as I then erroneously reduced *X. speciosum* Merr. (*X. merrillii* Pamp.) to *X. verdugonianum* Naves. The superficial resemblances of *X. verdugonianum* Naves and *X. speciosum* Merr. (*X. merrillii* Pamp., *X. purpureum* Gugerli) are close, but the calyx characters are very distinct. And finally Gugerli, in 1940, misled by Pampanini's misinterpretation of the rules governing the



validity of binomials redescribed this already twice named *Culion* species as *Xanthostemon purpureum* Gugerli (p. 53), sect. *Vesicaria*, cited its type collection as representing *X. verdugonianum* Naves (p. 64), sect. *Cylindrica*, and finally (p. 131) listed and discussed *X. merrillii* Pamp. (1905), with *X. speciosum* Merr. (1904) as a synonym, as an excluded species. And all the time *X. speciosum* Merr. was the valid name for this now thrice-named species. He even mentioned the striking calyx characters specified by me in 1904 by which *X. speciosum* Merr. was distinguished from *X. verdugonianum* Naves, which were the very characters on which he based his section *Vesicaria*. And so a page or two of print is now called for to explain the details of this nomenclatural comedy of errors, in which Merrill, Pampanini, and Gugerli are involved.

There is no overlapping in the Philippine ranges of the two superficially similar species, *X. speciosum* Merr. and *X. verdugonianum* Naves. The latter is confined to the central and southern Philippines, the former to the Calamian-Palawan group in the central western part of the Philippines. Incidentally these islands all lie on the continental shelf, and their floras and faunas contain strong Bornean elements which do not extend into the Philippines proper.

***Xanthostemon verdugonianum*** Naves ex F. Vill. in Blanco Fl. Filip. ed. 3, Novis. App. 82. pl. 300. 1880; Merr. Enum. Philip. Fl. Pl. 3: 183. 1923, excl. syn.; Gugerli, Repert. Sp. Nov. Beih. 120: 64. 1940, excl. syn.

To be excluded from Gugerli's consideration of this endemic Philippine species are the synonyms *X. merrillii* Pamp. and *X. speciosum* Merr., and from the specimens cited, *Merrill 682*, these being accounted for under *X. speciosum* Merr., above. Otherwise, all of the collections cited by Gugerli manifestly belong with this species of Naves. Additional collections are *F. B. 24422 Miras, Soriano & Mariano* (A, U), from Agusan Province, Mindanao, *F. B. 7546 Hutchinson* (U), *F. B. 22833 Ponce* (A,U), *F. B. 23023 Razon* (G), and *2302* (A), *F. B. 28158 Tomeldan* (A), and *F. B. 29419 Rojas*, all from Surigao Province, Mindanao, *F. B. 23942 Cortes & Knapp* (U), Panay, and *F. B. 19535 José* from Sibuyan. The species, type from Surigao no longer extant, is now known from more than 20 individual collections, its range being Sibuyan, Panay, Leyte, Dinagat, Tinago, and the Provinces of Agusan and Surigao in Mindanao.

#### UNLISTED BINOMIALS

In the course of this little study I have noted several unlisted binomials, one dating from as early as 1886. These are:

***Xanthostemon \*myrtifolium*** [Brongn. & Gris] Pampaloni, Nuovo Giorn. Bot. Ital. II. 13: 135. 1906 [*Fremya myrtifolia* Brongn. & Gris]; Gugerli, Repert. Sp. Nov. Beih. 120: 68. 1940.

Doctor Gugerli gave the reference to Pampanini's paper in the *Nuovo Giorn. Bot. Ital.* II. **12**: 682. 1905, this being an error; the binomial does not there appear, nor is it to be found elsewhere in Pampanini's paper of 1905. The next year it was published without its name-bringing synonym, as above indicated. Yet in his monograph of 1940 Dr. Gugerli also erroneously included a second reference to *X. myrtifolium* Pamp. [ex Baker f.] in *Jour. Linn. Soc. Bot.* **45**: 34. 1921. But there Baker f. credited the binomial to Guillaumin. Guillaumin however, apparently never published such a name, as a check on his various papers on the New Caledonian flora shows that he correctly credited the binomial to Pampanini. Pampaloni undoubtedly received his binomials from Pampanini.

**Xanthostemon \*pachyspermum** F. Muell. & F. M. Bailey, *Occ. Pap. Queensl. Fl.* **1**: 4. 1886; F. M. Bailey, *Queensl. Fl.* **2**: 642. 1900; Gugerli, *Repert. Sp. Nov. Beih.* **120**: 132. 1940, inter sp. excl. = *Tristania pachysperma* (F. Muell. & F. M. Bailey) Francis, *Queensl. Nat.* **14**: 56. 1951 (*T. odorata* C. T. White, 1920).

Doctor Gugerli cited the authority for the binomial as F. M. Bailey, and gave the reference to the Queensland Flora only; there, however, the reference is to the earlier (but as yet unlisted) place of publication as I have above recorded the entry. He was correct in excluding the species from *Xanthostemon*, as it was described as having but one or two large seeds in each cell of the capsule, these seeds 7 to 10 mm. in diameter. He thought that Bailey might have had a specimen of *Kunzea*, sect. *Salicia*. The mystery is now solved by W. D. Francis' reëxamination of the type in 1950, who finds it to represent the same species as the Queensland *Tristania odorata* C. T. White.

**Xanthostemon \*pubescens** [Brongn. & Gris] Pampaloni, *Nuovo Giorn. Bot. Ital.* II. **13**: 128. 1906; Gugerli, *Repert. Sp. Nov. Beih.* **120**: 126. 1940; Guillaumin, *Fl. Nuov. Caléd.* **234**. 1948. New Caledonia = *X. multiflorum* (Montr.) Beauvisage, supra.

Pampaloni cited no synonyms and no authorities; he received his binomials from Pampanini, with whom he was working; but nowhere did the latter author publish this binomial.

**Xanthostemon \*speciosum** Pamp. *Nuovo Giorn. Bot. Ital.* II. **12**: 688. 1905, in obs. (*Fremya speciosa* Brongn. & Gris). New Caledonia.

In Dr. Gugerli's treatment, p. 97, he erroneously credited this binomial to Niedenzu who never published it, overlooking Pampanini's obscure entry. The proper name for this New Caledonian species is *X. gugerlii* Merr.

#### EXCLUDED SPECIES

**XANTHOSTEMON CELEBICUM** Koord. Meded. 's Lands Plant. **19**: 465, 637. 1898; Gugerli, *Repert. Sp. Nov. Beih.* **120**: 130. 1940 = **Kjellbergiodendron celebicum** (Koord.) Merr., infra.

*XANTHOSTEMON PACHYSPERMUM* F. Muell. & F. M. Bailey, Occ. Pap. Queensl. Fl. 1: 4. 1886; Gugerli, op. cit. 132 = ***Tristania pachysperma*** (F. Muell. & F. M. Bailey) Francis, supra.

### **Kjellbergiodendron** Burret

This genus was described in 1936, with two species, on the basis of two collections made by Gunnar Kjellberg in Celebes in 1929. The previously unplaced and inadequately described *Xanthostemon celebicum* Koord. is now found to belong in Burret's very distinct genus. The genus is strongly characterized by its relatively large, more or less fleshy, 1-celled and 1-seeded, indehiscent fruits, 2-celled ovaries, stamens arranged in five phalanges, and its alternate leaves. While the genus is a sharply defined one, this statement apparently does not apply to its few species, as they impress me as being difficult to distinguish from each other. It is probable that this difficulty stems largely from the inadequateness of the available herbarium specimens, most of these being sterile, or with young flower buds or with very immature fruits. Certain sterile specimens from Malili, Celebes, distributed as representing the undescribed *Tristania celebica* Koord., belong with *Kjellbergiodendron hylogeiton* Burret. This Koorders binomial appears as a *nomen nudum* in Koorders-Schumacher, Syst. Verzeich. 3: 96. 1914; I have seen three of the four Koorders specimens listed under this *Tristania*, all sterile.

### **Kjellbergiodendron celebicum** (Koord.) comb. nov.

*Xanthostemon celebicum* Koord. Meded. 's Lands Plant. 19: 465, 637. 1898; Koord.-Schum. Syst. Verzeich. 3: 96. 1914; Gugerli, Repert. Sp. Nov. Beih. 120: 130. 1940, inter sp. ign.

In Koorders' report on the Celebes flora he first listed this species with brief comments on page 465, and on page 637 he published a short and inconclusive description, some of the reasons for this perhaps to be apparent in the following notes. It was not until 1914 that any of the Koorders Celebes numbers were actually associated with the description (for Koorders cited no numbers and indicated no type in 1898) when Mrs. Koorders listed eleven numbers, all but four of which represent sterile specimens. The description was of such a nature that Dr. Gugerli in 1940, without access to authentically named specimens, could not place the species in relation to the other described ones in *Xanthostemon*.

Five of the Koorders Celebes numbers are sterile, so that in selecting a type we are limited to four numbers only, 18097, 18544, with not fully developed flower buds, and 18240, 19302, with fruits. All of these have the smaller leaves, 10 to 15 cm. long, 3.5 to 5.5 cm. wide. I arbitrarily designate Koorders 18544, three sheets at Buitenzorg, as the type for flowers, and Koorders 19302 in the same herbarium as the type for fruits. I have actually seen Koorders 18097, 18964, 18322,



18960, 18321, all in the Leiden herbarium, but I deliberately ignore the last three of these as they are sterile and with very large leaves, up to  $33 \times 7$  and  $37 \times 9.5$  cm.; nos. 18192, 18305 also belong in this category. Koorders thought that these large leaved forms were from young plants; one cannot prove this short of intensive field work, but they may, of course, belong with the species. Numbers 18097, 18240, 18544, 19302 are apparently normal, as these are the specimens with flower buds or with fruits, the leaves being 10 to 15 cm. long and 3.5 to 5.5 cm. wide. They clearly belong to a single species, and 18964, (sterile) falls in this category.

It is rather curious that Koorders placed this species in *Xanthostemon*, because of its large fruits, which he mentioned as being 1.8 cm. long and 1.2 cm. thick (the largest at Buitenzorg is 1.9 cm. long), and which he apparently knew, from his dissections and sketches, were indehiscent and 1-seeded. In his dissection notes on the flower buds, which he also did not publish, he observed that the stamens were arranged in five phalanges. These fruit and flower characters are remote from those of *Xanthostemon*. A dissection of a flower bud of *Koorders 18097* shows that the strictly inferior ovaries are 2-celled, each with a fair number of ovules. All these characters are those of *Kjellbergiodendron* Burret which was not characterized and published until 1936. I am indebted to Dr. J. H. Kern of Buitenzorg for copious notes on the Koorders Buitenzorg specimens and his unpublished dissection data.

In addition to the several Koorders numbers that I am willing to accept as representing *Xanthostemon celebicum* Koord. I feel safe in referring to this species the following collections, unfortunately all sterile:

CELEBES: Minahassa, *Koorders 18097* (L), 18964 (L); Manado, *Neth. Ind. For. Serv. bb. 19646* (A,L); Palopo, *bb. 20895* (A,L); Moena Island immediately south of southwestern Celebes, *Neth. Ind. For. Serv. bb. 21097* (A,L), 21386 (A), 4187 (L); Moluccas, Ternate and Batjan, *Neth. Ind. For. Serv. bb. 16476* (A,L) (the small islands of Ternate and Batjan are close to the west coast of Halmahera, across the Molucca Passage from the classical locality, Minahassa, northeastern Celebes). Because of the small flower buds, *Neth. Ind. For. Serv. Cel. II. 485* (L) from Malili probably belongs here while *Neth. Ind. For. Serv. bb. 24124, 31513* (A) have puberulent calyces, the buds somewhat intermediate in size between those of Koorders' species and *K. limnogeiton* Burret.

While it is clear that *Xanthostemon celebicum* Koord. is a *Kjellbergiodendron*, it is not easy to determine its relationships with the two previously described species of that genus. The almost mature but as yet unopened flower buds are 6 mm. long, and under a lens the calyces are densely puberulent. Hence the flowers should be distinctly smaller than are those of *Kjellbergiodendron limnogeiton* Burret, which are described as glabrous, while the fruits (mature?) are very much smaller ( $1.8-1.9$  cm.  $\times$   $7-9$  mm.), as opposed to  $5-6$  cm.  $\times$   $3.5-3.8$  cm. in Burret's species. One may judge by Koorders' sketches and by the

thickness of cotyledons observed by him that his fruits were at least partly mature. It is suspected that Koorders species is closest to *K. hylogeiton* Burret, the fruits (mature?) of the latter described as 2.5 to 3 cm. long and 1.5 cm. thick; but its coriaceous leaves are described as being up to 25 cm. long and 9 cm. wide; they are actually up to 30 cm. long and 10 cm. wide.

Some additional descriptive data for this Koorders species are: Leaves normally 12 to 15 cm. long, 4 to 5 cm. wide, firmly chartaceous or subcoriaceous, usually olivaceous above, pale brownish beneath and glandular-punctate when dry; primary nerves up to 15 on each side of the midrib, slender but distinct and somewhat elevated on the lower surface, rather irregular, anastomosing and forming a distinct intramarginal nerve 3 to 5 mm. from the margin, and with a less distinct secondary marginal nerve close to the edge of the leaf; alternating with the primary nerves are less conspicuous secondary ones. Flowers apparently small (only unopened buds seen), the calyces rather densely puberulent, the buds seen not over 6 mm. long. Stamens many, in five distinct phalanges. Ovary wholly inferior, 2-celled, the cells with many ovules. Fruit indehiscent, 1-celled, 1-seeded.

**Kjellbergiodendron hylogeiton** Burret, Notizbl. Bot. Gart. Berlin **13**: 103. fig. 5, 4-6. 1936.

*Tristania celebica* Koord. ex Koord.-Schum. Syst. Verzeich. **3**: 96. 1914, *nom. nud.*, syn. nov.

The type is *Kjellberg 2016*, from Malili, Celebes, at sea level, its mature flowers not yet known. I have not seen the type, but confidently refer here *Neth. Ind. For. Serv. Cel. 334* (L), two sheets, one with very immature flower buds, the other with immature fruits, and also *Cel. II-261* and *bb. 23269* (A), all from Malili, Celebes. On the sheet with the immature fruits of *Cel. 334*, the leaves are up to 30 cm. long and 10 cm. wide, the stout infructescences up to 20 cm. long, and the immature fruits (seeds not formed) 2 to 2.5 cm. long. It is, of course, possible that some of the smaller leaved sterile specimens above referred by me to *K. limnogeiton* Burret may belong with *K. hylogeiton* Burret. One concludes that it would perhaps be better not to name sterile specimens to the species in this difficult assemblage. I cannot help but feel that certain sterile specimens, and one or two with very immature inflorescences from Malili, partly distributed as representing the undescribed *Tristania celebica* Koord., mentioned above, belong with this Burret species. Some of these are *Neth. Ind. For. Serv. Cel. IV-106*, *Cel. 106*, *Cel. 166*, *Cel. 193*, *bb. 18800*, *bb. 26286* (all A).

**Kjellbergiodendron limnogeiton** Burret, Notizbl. Bot. Gart. Berlin **13**: 103. fig. 5, 1-3. 1936.

The type of this, which I have not seen, is *Kjellberg 2170* from Towuti, Celebes, alt. 300 m., on lake margins, its leaves coriaceous, 15-19 cm. long, 5-6 cm. wide, its fruits 5-6 cm. long. Burret's flower-

ing material was very scanty and unsatisfactory, yet he described the flowers as "majusculi," and, as illustrated, about 2 cm. in diameter and 1.2 cm. long (he did not actually specify these measurements; his illustration shows only a single attached flower). This is a much larger flower than one would suspect to develop from the small buds of the Koorders species, as these, nearly mature, are but 6 mm. long. I am certain that the following specimens from Malili, Celebes, represent this Burret species; *Neth. Ind. For. Serv. bb. 23544* (A), its one fruit 4.5 cm. long, 3 cm. thick; *bb. 18920* (A,L), its flower buds about 1.4 cm. long, glabrous, oblong-obovoid, the stout calyx tube 4 mm. thick, glabrous, narrowed below, rugose, and 4-5 mm. long, the concave imbricate petals suborbicular or obovate, rounded, at least 1 cm. long. Sterile but almost certainly belonging here in spite of their, in general, smaller leaves are: *Neth. Ind. For. Serv. Cel. II. 240; II. 241; II. 243* (A,L); *Cel. II. 242, 253, 485* (L); *bb. 19820* (A,L); *bb. 22730, 23544, 29974* (A); and *Boschwezen Mantri bb. 1836, 1854, 1890* (L), from the Malili region.

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## NOTES ON THE FLORA OF CHINA, II

SHIU-YING HU

*With two plates*

IN 1947 K. M. Feng of the Fan Memorial Institute of Biology made a botanical expedition in southeastern Yunnan, in the region immediately east of Mengtze where A. Henry made his classical collections. From August 5 to December 20 of that year Feng collected 2985 field numbers in a relatively small area between longitude  $104^{\circ}$  and  $105^{\circ}$  East, on the Tropic of Cancer and a half-degree south. From working over this collection at the Arnold Arboretum it is apparent that a number of new entities are included. Below are described a new genus, *Styrophyton*, of the Melastomataceae, and several new species of the same family. Critical notes on other taxa in this family are recorded. The material is arranged alphabetically according to the genus and species. All the collections cited belong to the herbarium of the Arnold Arboretum.

Since the system of transliteration employed in Feng's filed labels differs from that used in the Gazetteer of Chinese Place Names based on the Index to the V. K. Ting Atlas compiled by the United States Board on Geographical Names and from that of the Map of China published in 1945 by the National Geographic Society of America, the equivalent spellings for the major localities are given below so that the reader may be helped to find the places on standard maps. After Feng's transliteration, those of the other two systems are entered with their abbreviations USB and NGS following: Ma-kuan, Ma-kuan (USB), Makwan = Anping (NGS); Mar-li-po, Ma-li-p'o (USB), Malipo (NGS); Si-chour, Hsi-ch'ou (USB), Sichow (NGS); Wen-shan, Sen-shan (USB), Wenshan = Kaihua (NGS).

**Allomorpha urophylla** Diels in Bot. Jahrb. 65: 102. 1932. — Li in Jour. Arnold Arb. 25: 10. 1944.

YUNNAN: Si-chour-hsien, Shiang-pyng-shan, in mixed forest by stream, alt. 1400–1500 m., *K. M. Feng 11468* (shrub 5 ft. high, flower pink, common); Ma-kuan-hsien, Ching-kou (Lao-chün-shan), in open thickets, alt. 1100–1500 m., *K. M. Feng 13675* (shrub 5 ft. high, fruit green, common).

As far as we know, *Feng 11468* establishes the eastern and northern limit of the range of the species.

**Blastus fengii** sp. nov.

Frutex ca. 1.3 m. altus, ramis subquadrangularibus, glabris, tuberculatis, ramulis junioribus squamuloso-glandulosis, glaberrimis; foliis chartaceis, junioribus glandulosis, oblongo-ovatis vel ellipticis, 8–14 cm. longis, 4–7.5 cm. latis, basi obtusis raro rotundatis, apice acuminatis, acumine 2 cm.

longo, margine integris setosisque, nervis primariis 5, marginalibus duobus tenuioribus additis, nervis transversis conspicuis, supra inter nervos sparse setosis, subtus glabris, petiolo 2–4.5 cm. longo, squamuloso-glanduloso, glabro; cymis subsessilibus, 3-floris, ex axillis foliorum delapsorum productis; flores ignoti; pedicellis fructuum 9–12 mm. longis; capsulis subglobosis, 5 mm. diametro (Tab. II, fig. 1), costatis 8 inconspicuis, glaberrimis, sepalis persistentibus, semi-rotundatis, 2–3 mm. longis latisque, glabris; seminibus subovoideis, plus minusve curvatis (Tab. II, fig. 1), 0.4 mm. longis, tuberculatis, breve rostratis.

YUNNAN: Mar-li-po, Chung-dzia, in open thickets, alt. 1800–2100 m., *K. M. Feng 12726* (TYPE) (herb 3 ft. high, fruit yellowish red, common); same region, Sze-tai-po, in mixed forest, alt. 1600–2000 m., *K. M. Feng 13780* (shrub 4 ft. high, flower pink, common).

In its axillary inflorescences situated at the mature portion of the stem where the leaves are often absent, and in its long pedicellate fruits with persistent roundish sepals, this species appears to be nearest to *Blastus hirsutus* Li. The latter species can readily be recognized by its hirsute branchlets and fruits.

### *Cyphotheca hispida* sp. nov.

Herba 1 m. alta, ramis subteretibus, 2 mm. diametro, hispidis, junioribus incanis; foliis membranaceis, oblongo-ovatis, 5.5–10 cm. longis, 3–5 cm. latis, basi rotundatis vel subcordatis, apice acuminatis, acumine 1 cm. longo, margine integris hispidisque, nervis primariis 5, nervis transversis supra obscuris, subtus elevatis, supra inter nervos sparse setosis, basi glanduloso-hirtellis, subtus hispidis nervis praesertim, petiolo 1–5 cm. longo, hispido; inflorescentiis subumbelliformibus cymis, terminalibus, 3- vel 4-floris, pedunculis 8 mm. longis; flores 4-meri (Tab. II, fig. 10), pedicellis 9 mm. longis, receptaculis subcampanulatis, hispidis; sepalis 4, ovatis, hispidis, 2 mm. longis, acutis; petalis 4, rubris, obovatis, 8–10 mm. longis; staminibus 8, inaequalibus, antheris incurvis, apice attenuatis, 1-porosis, thecis basi nonproductis, majoribus 5 mm. longis, minoribus 3 mm. longis, connectivis postice incrassatis; ovario ad receptaculum septis adnato, apice collo tubiformis laciniato laciniis glanduloso-ciliatis ornato, stylo paulo curvato, glanduloso-hirto; fructibus ignotis.

YUNNAN: Si-chour-hsien, Faa-doou, in mixed forest, alt. 1450–1550 m., *K. M. Feng 11746* (TYPE) (herb 3 ft. high, flower pink, common).

The thickened connectives of the anthers of the smaller stamens, the glandular-ciliate corona at the apex of the ovary, and the hirtellous style of this species suggest a relationship with *Cyphotheca montana* Diels. *Cyphotheca hispida* can readily be distinguished from the Diels species by its hispid stem and leaves, its smaller habit, and the lack of any evident overgrowth of the thecae. The thecae of the smaller stamens of *Cyphotheca montana* are slightly produced at the lower front ends.

It is interesting to note that, although the form of the seeds of the

Melastomataceae has been employed as a major character for the delimitation of the genera or sections of the family, the nature of the seeds of *Cyphotheca* has been lacking in botanical descriptions. It seems fitting to add here a note concerning it: Seeds numerous, subovoid-cuneate, beaked (Plate II, fig. 3), 0.8 mm. long, 0.5 mm. wide at the truncate end, the testa brown, distinctly tuberculate, the beaked side with a shiny black aril. This description is prepared from a specimen (*T. T. Yü 16627*) of *Cyphotheca montana* Diels.

***Fordiophyton longipetiolum* sp. nov.**

Frutex ca. 1.3 m. altus; ramulis glabris; foliis membranaceis, inaequalibus, lanceolatis, majoribus 9–14 cm. longis, 3–4 cm. latis, minoribus 3–6.5 cm. longis, 1–2 cm. latis, basi cordatis, apice acuminatis, acumine 1–2.5 cm. longo, margine obsolete serrulatis, nervis principalibus 5, paulo elevatis, petiolo 1–1.4 cm. longo; inflorescentiis paniculatis; pedunculis 2–3 cm. longis; ramis strictis patentibus, glanduloso-setulosis, bracteolatis; cymis singularibus 1- to 3-floris; bracteis cordatis, 2 mm. longis, 2–3 mm. latis, glabris, persistentibus; floribus pedicellatis, pedicellis 4–6 mm. longis, glabris, receptaculis anguste infundibuliformibus, 6–7 mm. longis, glabris, rare 1–3 glandulosis setis; sepalis deltoideis, 2 mm. longis, 2 mm. latis, apice seta glandulosa; petalis rubris, apice in setulam exeuntibus; staminibus 8, inaequalibus, antheris majoribus linearibus, 15 mm. longis, thecarum basimus cornuto-productis, antheris minoribus oblongis, 4 mm. longis, flavis, thecarum basibus productis; capsulis ignotis.

YUNNAN: Si-chour-hsien, Faa-doou, in mixed forests, alt. 1450–1550 m., *K. M. Feng 11829* (TYPE) (shrub 4 ft. high, flower pink-rose, rare).

In general appearance this species suggests *Fordiophyton strictum* Diels and is probably most closely related to it. The latter species can readily be distinguished from *F. longipetiolum* by its subsessile leaves and glandular-setose bracts and sepals.

***Medinilla nana* sp. nov.**

Frutex humilis, 0.5–1 m. altus; ramis cinereis, rugosis et verruculosis; ramulis quadrangularibus, brunneis, internodiis 1–3 cm. longis, alatis, axillis foliorum setis sparse vestitis; foliis coriaceis, obovatis, 1–2.3 cm. longis, 0.7–1.7 cm. latis, paucidenticulatis, ad apicem 2 vel 3 dentibus minutis, basi obtusis, apice rotundis et retusis, costa supra impressa, subtus elevata, nervis lateralibus obscuris, petiolo 1–3 mm. longo; inflorescentiis terminalibus, solitariis vel cymosis simplicibus, cymis 2–floris; pedunculis 5 mm. longis; bracteis ovatis, glanduloso-erosis; pedicellis 2–3 mm. longis; flores ignoti; baccis oblongo-subglobosis, 8 mm. longis, 6 mm. diametro; sepalis persistentibus rotundatis, erosis et glandulosis; seminibus numerosis, minutis, ovoideis, 1 mm. longis, 4–5 mm. diametro, testis reticulatis.

YUNNAN: Si-chour-hsien, Faa-doou, in mixed forest, alt. 1500–1600 m., *K. M. Feng 11920* (shrub 1 ft. high, fruit green, common); Mar-li-po, Chung-



dzai, in mixed forest, alt. 1600–1800 m., *K. M. Feng* 12784 (TYPE) (shrub 3 ft. high, fruit green, common).

I can suggest no close relative for this very distinct species. Its broadly winged paired branchlets, its small obovate paucidenticate coriaceous leaves, and its terminal solitary flowers or simple cymes are unlike any known species of *Medinilla*. Nevertheless, the fleshy berries with their thin calyx tube and exterovarial chambers place the species in Bakhuizen's section *Hetero-Medinilla* of this genus. The small ovoid seeds with their reticulate testas suggest relationship to *Pachycentria fengii* S. Y. Hu.

***Medinilla petelotii* Merr. in Univ. Cal. Publ. Bot. 13: 137. 1926.**

YUNNAN: Si-chour-hsien, Ting-mann, in mixed forests, alt. 1300–1500 m., *K. M. Feng* 12334 (scandent shrub 5 ft. high, flowers pink-rose, rare); Mar-li-po, Huang-jin-in, in mixed forests, alt. 1300–1400 m., *K. M. Feng* 13063 (shrub 5 ft. high, flowers lavender, rare); same region, Sze-tai-po, Loa-chün-shan, in mixed forest, alt. 1300–1500 m., *K. M. Feng* 13946 (shrub 4 ft. high, fruit green, common).

*Feng* 13063 fits Merrill's description well, and it matches the photograph of *Pételot* 1791 (type of *Medinilla petelotii* Merr.) in every respect. The fertile portion of *Feng* 12334 appears to have been a section from the lower part of a creeping stem. It has many fibrous adventitious roots. The inflorescences on such a stem are much more ramified and also appear longer than the typical ones as represented by *Pételot* 1791 and *Feng* 13063. With all other aspects identical, I am inclined to think that the larger inflorescence is due to the vigor of the plant.

*Tsai* 60315 from Ping-pien-hsien, Yunnan, appears to belong here.

***Melastoma normale* D. Don, Prodr. Fl. Nepal. 220, 1825. — Rehd. & Wils. in Sarg. Pl. Wils. 2: 421. 1915. — Li in Jour. Arnold Arb. 25: 8. 1944.**

YUNNAN: Si-chour-hsien, Faa-doou, in open thickets on rock, alt. 1450–1550 m., *K. M. Feng* 11870 (shrub 4 ft. high, fruit green-yellow, common); Mar-li-po, Sze-tai-po (Loa-chün-shan), in open thickets by stream, alt. 1100–1300 m., *K. M. Feng* 14053 (herb 3 ft. high, flowers pink-purple, common).

Feng's designation of the habit of the plant as represented by his number 14053 does not seem to be appropriate, for our specimen of this number exhibits a strong woody third-year stem. In the herbarium this species is often confused with *Melastoma candidum* D. Don, and in botanical literature the diagnostic characters given are rather inadequate, since they were drawn from the indumentum of the stem and the shape of the leaf-base. Both of these characters vary with the ecological conditions under which the plant grows and the age and vigor of the plant. *Melastoma normale* D. Don is generally recorded as, "stem with long spreading hair, leaves with round and obtuse base," and *Melastoma candidum* D. Don as "stem with appressed scale-like hairs and leaves with subcordate bases." Round and subcordate bases are sometimes very hard to distinguish, and

the spreading hairs are so coarse and dented that they appear scaly. Detailed examination of our material seems to reveal two constant characters that can be employed in the diagnosis of these two species. In *Melastoma normale* D. Don the sepals are linear-lanceolate and the anterior lobes of the connectives of the large stamens are small, round, and almost undivided, while in *Melastoma candidum* D. Don the sepals are broad deltoid and the anterior lobes of the connectives of the large stamens are pointed and over 2 mm. long. In general *Melastoma normale* D. Don has lanceolate leaves and smaller globose fruits, and the leaves of *Melastoma candidum* D. Don are ovate and the fruits larger and oblong.

**Osbeckia chinensis** Linn. Sp. Pl. 345. 1754. — Li in Jour. Arnold Arb. 25: 4. 1944.

YUNNAN: Si-chour-hsien, Faa-doou, on open grassy slopes, alt. 1450–1550 m., *K. M. Feng* 11765 (herb 3–10 in. high, flowers pink, common).

This is probably the most widely distributed species of the *Melastomataceae* in China. It occurs in the coastal region from Foochow to Hongkong and thence westward over all the warm temperate region of China. It can readily be recognized by (1) the small herbaceous habit; (2) the lanceolate leaves; (3) the terminal simple cymes; (4) the stellate tufted calyx tubes; (5) the persistent corona of rigid hairs at the apex of the ovary; and (6) the glabrous urn-shaped fruits. The vernacular name “t’ien-hsiang-lu” (heavenly incense burner) is a very good connotation of the characteristic fruit.

**Oxyspora paniculata** DC. Prodr. 3: 123. 1828. — Li in Jour. Arnold Arb. 25: 12. 1944.

YUNNAN: Wen-shan-hsien, Hwang-tsao-bah, by streams on scrub, alt. 1600 m., *K. M. Feng* 11011 (herb 2 ft. high, flowers lavender-red, common); Si-chour-hsien, Shiang-pyng-shan, in mixed forests by streams, alt. 1400–1500 m., *K. M. Feng* 11472 (shrub 5 ft. high, flower rose-pink, common); Mar-li-po, Sze-tai-po (Loa-chün-shan), in open thickets by streams, alt. 1300–1500 m., *K. M. Feng* 14037 (shrub 3 ft. high, flower rose-pink, common).

*Oxyspora paniculata* DC. is the type species of the genus. It has very unique seeds, the form of which is so characteristic that I have not seen the like in any other Asiatic genus of the *Melastomataceae*. The embryo proper is straight, club-shaped, or subovoid. The testa is so produced that the seed appears cuneate. It is beaked on the aril side of the truncate end, and opposite the beak there is a distinct spur which is longer than the beak. In a profile view the seed appears like the head of an adze (Plate II, fig. 4).

**Pachycentria fengii** sp. nov.

Frutex sempervirens, epiphyticus, scandens, ramulis teretibus, glabris, fusco-rubrescentibus, extimis compressis, lenticellis albis, prominentibus; foliis subcoriaceis, integerrimis, obovatis, 3.5–8.5 cm. longis, 2–3.5 cm.

latis, basi cuneatis vel obtusis, apice acuminatis, acumine 5–10 mm. longo, obtuso, trinerviis, nervis supra planis, subtus elevatis, reticulis obscuris, petiolo 6–10 mm. longo, glabro; flores ignoti; inflorescentiis fructiferis corymbosis, laxis, terminalibus; pedunculis 1–1.7 cm. longis; pedicellis 5 mm. longis; baccis urceolatis, 6–7 mm. longis, 4–5 mm. diametro (Tab. II, fig. 5–7); sepalis persistentibus deltoideis, apice postice minutis uncinatis; seminibus numerosis, minutis, ovoides, 1 mm. longis, 0.7 mm. diametro, testis reticulatis (Tab. II, fig. 8).

YUNNAN: Si-chour-hsien, Faa-doou, on trees in mixed forest, alt. 1500–1550 m., *K. M. Feng 11789* (TYPE) (shrub 4 ft. high, fruit green, pedicel red, common).

*Pachycentria* Blume was first discovered in Java. The center of its distribution is the Malay Archipelago. Hayata in 1912 described a species from Formosa and Ridley in 1915 published another one from the Malay Peninsula. *Pachycentria fengii* S. Y. Hu, seems to be the first species recorded from the Chinese mainland. It sets the northern limit for the genus. To Blume, *Pachycentria* differs from *Medinilla* in: "1) tubo calycis sursum cyathiformi–dilatati circa ovarium fortius constricto; 2) petalis acuminatis; 3) staminum structura diversa, quum antherarum connexivum in *Medinilla* omnibus ad basin antice auriculas duas et postice calcar subulatum exserat, hic autem tantummodo postice calcar parvo crassiusculo muniatur." Bakhuizen f. regarded the degree of union of the ovary with the calyx tube to be more significant for the generic delimitation. He maintained that in *Pachycentria* the ovary is "wholly concrescent with the calyx tube," while in *Medinilla* it is "adnate to the calyx tube with longitudinal septa." The calyx tubes of the Formosan and the Chinese material are not so much constricted as those of the Malaysian species. Nevertheless, the connection between the ovary and the calyx tube is complete. There does not seem to be any doubt that our material is a species of *Pachycentria*.

#### *Phyllagathis wenshanensis* sp. nov.

Herba, caulibus petiolisque dense longe crispo-hirsutis, rhizomate prostrato, ramis teretibus, 5 mm. diametro; foliis valide membranaceis, orbicularibus, 5–7 cm. longis latisque, olivaceo-viridibus, basi perspicue cordatis, apice rotundatis et plerumque emarginatis, nervis primariis 5 vel 7, nervis transversis supra obscuris, subtus perspicuis et dense crispo-hirsutis, margine integris et ciliatis, supra disperse brevis setosis et molliter crispo-hirsutis, subtus hirsutis, nervis dense crispo-hirsutis, petiolo 2.5–4.5 cm. longo; inflorescentiis umbellatis, terminalibus, 4-floris, pedunculis 11 cm. longis, hirtellis; flores ignoti; pedicellis fructuum 1 cm. longis, hirtellis; calycibus persistentibus deltoideis, acutis; capsulis turbinatis, hirtellis, 5 mm. longis; apice 5 mm. diametro, placenta supra ramificata, seminibus ovoides, 0.8 mm. longis, 0.4 mm. diametro, truncatis, tuberculatis, brevis rostratis.

YUNNAN: Wen-shan-hsien, Lao-jiun-shan, in mixed forest, alt. 2300 m., *K. M. Feng 11186* (TYPE) (herb 4 in. high, fruit greenish, rare).



The creeping habit and rounded leaves of this species suggest a relationship with *Phyllagathis cavaleriei* (Lévl. & Van.) Guill., which has glabrous capsules and leaves with long setose hairs.

***Plagiopetalum henryi* (Kränzl.) comb. nov.**

*Barthea cavaleriei* Lévl. in Fedde, Rep. Spec. Nov. 8: 61. 1910, pro parte, quod *Esquirol* 215.

*Sonerila henryi* Kränzl. in Viert. Nat. Ges. Zürich 76: 152. 1931.

*Plagiopetalum esquirolii* sensu Li, in Jour. Arnold Arb. 25: 10. 1944, non Rehder.

YUNNAN: Wen-shan-hsien, Pyng-bah, moist sandy margin of mixed forest, alt. 1700 m., *K. M. Feng* 11028 (shrub 2 ft. high, flower pinkish-red, rare); Marli-po, Pan-chia-chü, roadside, alt. 1800–2100 m., *K. M. Feng* 12674 (shrub 3 ft. high, fruit red, common).

Regarding *Plagiopetalum* Rehder stated, "In its floral structure it seems nearest to *Sonerila*, but that genus is easily distinguished by its trimerous flowers and symmetrical petals." If *Plagiopetalum* is accepted as a genus at all, then the transfer of *Sonerila henryi* Kränzl. is justified because of its tetramerous flowers and asymmetrical petals. Li (1944) interpreted *Sonerila henryi* Kränzl. and *Plagiopetalum esquirolii* (Lévl.) Rehd. to be conspecific. After detailed examination of the materials at hand, including *Wilson* 3261, the type of *Plagiopetalum quadrangulum* Rehder which, in turn is the type species of the genus and has been interpreted by both Diels and Rehder as synonymous with *Plagiopetalum esquirolii* (Lévl.) Rehder, I find it hard to accept this view. *Plagiopetalum esquirolii* (Lévl.) Rehd., as typified by *Wilson* 3261, represents a plant devoid of scabrous hairs on the petioles, peduncles, pedicels and receptacles, while these parts of the specimens that I designated as *Plagiopetalum henryi* (Kränzl.) S. Y. Hu are scabrous.

When Lévillé published *Barthea cavaleriei* he cited three specimens, namely *Cavalerie* 1552 and *Esquirol* 215 and 1581. He designated no type. Diels (1932) segregated *Cavalerie* 1552 and transferred it to *Bredia*. Here in our herbarium there is a photograph and a good fragment of *Esquirol* 215 which is identical with *A. Henry* 9077, an isotype of *Sonerila henryi* Kränzl. Since *Barthea cavaleriei* Lévl. is a synonym of *Bredia cavaleriei* (Lévl.) Diels, the next published specific name, is here adopted.

The seed of *Plagiopetalum henryi* (Kränzl.) S. Y. Hu has a very unique form. It is oblong in outline, 1 mm. long, 0.5 mm. in diameter, obscurely papillate, and appendaged on three sides (Plate II, fig. 11).

***Sarcopyramis bodinieri* Lévl. & Van. in Mem. Soc. Nat. Sci. Nat. Cherbourg. 35: 397. 1906; et in Fedde, Rep. Spec. Nov. 4: 95. 1907.**

*Sarcopyramis nepalensis* var. *bodinieri* (Lévl. & Van.) Lévl., Fl. Kouy-Tchéou 278. 1914.

*Sarcopyramis nepalensis* sensu Diels in Bot. Jahrb. 65: 111. 1932. — Li in Jour. Arnold Arb. 25: 25. 1944, non Wallich.

YUNNAN: Wen-shan-hsien: Loa-jiun-shan, in mixed forest, alt. 2300 m., *K. M. Feng 11188* (herb 3 inches high, leaves green above, purple below, fruits green and purple, common).

*Sarcopyramis bodinieri* Lévl. & Van. has been misinterpreted by several authors as *Sarcopyramis nepalensis* or its variety. Additional material in the flowering stage reveals certain characters which prove such a concept to be wrong. The type sheet of *Sarcopyramis bodinieri* Lévl. & Van. (*E. Bodinier 2393*) contains five specimens, four with small colored leaves and one with larger green leaves. Guillaumin (*Bull. Soc. Bot. France* 60: 343. 1913) suggested that the plants might represent a smaller form of *S. napalensis* Wall. Léveillé, without giving any reason, published it (1914) as such. Diels (1932) actually sank it into the synonymy of *Sarcopyramis nepalensis*, and his view has been accepted by later authors. In *Feng 11188* we have five plants which match the small plants of the holotype of *Sarcopyramis bodinieri* Lévl. & Van. Careful examination of these specimens as well as of the fragments of *Bodinier 2393* reveals that besides the smaller size of the plants and the purple color of the foliage there are certain floral characters which distinguish them as a distinct species. In *Sarcopyramis napalensis* Wall. the bracts are ovate, acute, the calyx lobes are truncate and ciliate, and the anthers are subelliptic with the notched apical ends slightly pointed. In *Sarcopyramis bodinieri* Lévl. & Van. the bracts are spatulate, the calyx lobes are eciliate, each with two horn-like projections, and the anthers are obcordate, each not much longer than the upward spur on the posterior side of the connective. The leaves of *Sarcopyramis bodinieri* Lévl. & Van. are sparsely setose above and glabrous beneath with an acute apex, while those of *Sarcopyramis napalensis* Wall. are elliptic or ovate-elliptic with an acuminate apex. Judging from the shape, the texture and the pubescence of the leaves, and the horned calyx lobes, *Sarcopyramis bodinieri* Lévl. & Van. is nearer to the Kwangsi specimens which have been named as *Sarcopyramis delicata* C. B. Rob. than to *Sarcopyramis napalensis* Wall. All specimens of the Kwangsi material have solitary flowers. *C. Y. Chiao 1304* from Ya-an, Sikang, with small ovate leaves and umbellate inflorescences, definitely belongs here.

*Sarcopyramis napalensis* Wall., *Tent. Fl. Nepal.* 32, *pl.* 23. 1824. — Li in *Jour. Arnold Arb.* 25: 25. 1944.

YUNNAN: Mar-li-po, Sze-tai-po (Lao-chün-shan), in mixed forest, alt. 1300–1500 m., *K. M. Feng 13974* (herb 4 in. high, fruit green, common).

*Sonerila cantonensis* Stapf in *Ann. Bot.* 6: 302. 1892. — Li in *Jour. Arnold Arb.* 25: 35. 1944.

YUNNAN: Si-chour-hsien, Faa-doou, in mixed forest, alt. 1500–1550 m., *K. M. Feng 11877* (Herb 1 ft. tall, flower pink-rose).

This species has been recorded from Kwangtung, Kwangsi, and Fukien. This is a new record for the flora of Yunnan.

*Sonerila yunnanensis* J. Jeffrey in Notes Bot. Gard. Edinb. 8: 207. 1914.

YUNNAN: Si-chour-hsien, Ting-mann, on cliffs in mixed forests, alt. 1100–1200 m., *K. M. Feng* 12349 (herb 4 in. high, fruit green, rare).

Jeffrey described the seeds of this species as “seminibus ovoideis minute punctulatis.” This is true. But on closer examination of *Feng* 12349 as well as of *Henry* 12337, the latter an isotype of the species, a very interesting character is revealed, concerning which it is worth while to add a note. This character is the presence of a two-lobed bladder at the apical end of the seed opposite the shiny dark brown aril (Plate II, fig. 9). Seeds of *Sonerila cantonensis* Stapf, *Sonerila hainanensis* Merr., *Sonerila picta* Korth., and *Sonerila tenera* Royle were also examined for comparison. With the exception of *Sonerila tenera* Royle, all these species have seeds with the bladder at the apical end of the aril side. This character correlates with the attenuated anther and the funnel-shaped fruit. One must conclude that such a character is at least subgenerically distinct.

### *Stapfiophyton erectum* sp. nov.

Herba erecta, 0.75 m. alta, ramis subteretibus, 5 mm. diametro, cinereis, junioribus furfuraceis; foliis subcoriaceis, glabris, ellipticis, 10–12 cm. longis, 3.5–5 cm. latis, basi obtusis, apice caudato-acuminatis, acumine 1.5–2 cm. longo, subtus glandulosis, nervis primariis 3, marginalibus duobus tenuioribus additis, nervis transversis supra obsoletis, subtus conspicuis, margine integro; petiolo 1.5–2.5 cm. longo, glanduloso, glabro; inflorescentiis subumbelliformi-cymis, paniculatis, terminalibus, pedunculis 3 cm. longis, cymis 3- vel 4-floris, pedicellis 4–5 mm. longis, glabris; flores ignoti; capsulis subturbinatis, 3–4 mm. diametro, apice depressis, placenta supra ramificata, seminibus ad basim adnatis; seminibus ovoideis, 0.7 mm. longis, 0.4 mm. diametro, rostratis, testa papillata.

YUNNAN: Mar-li-po, Huang-jin-in, in mixed forest, alt. 1300–1500 m., *K. M. Feng* 13082 (TYPE) (herb 2 ft. high, fruit whitish yellow, common).

By its ramified placenta this species can be placed either in *Phyllagathis* Blume or *Stapfiophyton* Li. It is because of its paniculate cymose inflorescences that the latter is chosen.

### *Styrophyton* gen. nov.

*Anerinclineistus* ? sensu Diels in Bot. Jahrb. 65: 101. 1932, non Korthals.

*Allomorphia* sensu Li in Jour. Arnold Arb. 25: 11. 1944, non Blume.

Inflorescentiae spicatae (Tab. I, fig. 1), floribus sessilibus, 4-meris; receptaculis subcampanulatis, strigosis; sepalis brevibus; petalis unguiculatis (Tab. I, fig. 5); staminibus 8, subaequalibus, antheris rectis, apice paulo attenuatis, 1-porosis, thecis antice basi paulo productis, connectivo postice non aucto, ovario basi receptaculi adnato, stylo attenuato, basi setis ornati, stigmatibus capitato. Fructus ovoideo-subglobosus, costis pallidis et prominentibus, quadrilocularibus; semina numerosa, minuta, cuneata,



truncata et rostrata. Frutices, ramis dense tomentosis; foliis magnis, ovatis, petiolatis.

TYPE SPECIES: *Styrophyton caudatum* (Diels) S. Y. Hu.

In all recent monographic work on Melastomataceae the inflorescences, whether they are panicles, umbels, scorpioid cymes, or otherwise, have been used as key characters for generic demarcations. Diels in 1932 first saw *Henry 10761*, a specimen from Yunnan with a spicate inflorescence. Realizing that it was unique, he described it as new, and probably because of its superficial resemblance to *Anerinckleistus Beccarii* Cogn., he doubtfully assigned it to *Anerinckleistus* Korthals. Li in 1944, on the basis of the prominent striation of the fruits, transferred Diels' species to *Allomorphia* Blume and added a description of the immature fruit and seed. With mature fruit from Feng's southeastern Yunnan collection I made careful dissections of the flower of *Henry 10761* (isotype), the young fruit of *Tsai 61591*, and the mature fruit of *Feng 12291*, and compared each with those of *Anerinckleistus* Korthals and *Allomorphia* Blume. After a review of all the literature concerning these two genera and a detailed examination of all the material in the Arnold Arboretum and the Gray Herbarium, I feel that the southeastern Yunnan plant is generically distinct. Besides the simple unramified spicate inflorescence, which at once distinguishes it from the paniculate type found in *Allomorphia* Blume, the short calyx tube is also very distinct. In *Allomorphia* Blume the calyx tube is tubular, at least twice as long as wide, and with the ovary attached only at its base. Consequently, in fruit, the free portion of the persistent calyx tube forms a tall collar, which is usually constricted at the base. Moreover, at the apex of the ovary in *Allomorphia* there is no appendage such as bristles or corona, and consequently the apical end of a mature fruit is smooth and concave. In *Styrophyton* the calyx tube (Plate I, fig. 6) is only slightly longer than wide, and in fruit it does not form an evident collar (Plate I, fig. 2). Moreover, the persistent bristles at the apex of the ovary render the apical end of the mature fruit rough. The cuneate, truncate, and beaked seed and the striate fruit of *Styrophyton* indicate a close relationship with *Allomorphia* Blume on the one hand, and its short calyx tube and the rough apical end of the fruit show affinity with *Anerinckleistus* Korthals on the other hand. These characters, together with the true spicate inflorescence, constitute my reasons for proposing a new genus whose natural position lies between *Allomorphia* Blume and *Anerinckleistus* Korthals. Species of the latter genus can easily be distinguished by their pedicellate flowers, paniculate inflorescences, prominent corona at the apex of the ovary, and smooth capsules with persistent corona exposed at the apical end of the fruit.

Regarding the fruit and seed characters of this taxon Li (1944) recorded, "The somewhat immature fruits are . . . one-celled . . . seeds very minute, oblong." This is far from correct. Both the cross- and the longitudinal sections of the mature, as well as the young fruit, appear to have four cells (Plate I, figs. 3 & 4). The seed of the mature fruit is oblong-

cuneate, 0.6–0.7 mm. long, 0.3–0.4 mm. in diameter, indistinctly ridged, truncate and beaked, slightly grooved on the beaked side and appendaged at the proximal end (Plate I, fig. 7). The testa is brown and smooth.

***Styrophyton caudatum* (Diels) comb. nov.**

*Anerincleistus* ? *caudatus* Diels in Bot. Jahrb. 65: 101. 1932.

*Allomorphia caudata* (Diels) Li in Jour. Arnold Arb. 25: 11. 1944.

YUNNAN: Si-chour-hsien, Ting-mann, in mixed forests, alt. 1200–1300 m., *K. M. Feng* 12291 (shrub 6 ft. high, young fruit green, common). Other specimens that I have examined are: *A. Henry* 10761 (isotype) from Mengtze, *H. T. Tsai* 60437, 60563, 61279, and 61591, all from Ping-pien hsien of Yunnan.

This species is a shrub which grows up to 5 meters high. In southeastern Yunnan it occurs in mixed forests at altitudes varying from 1000 to 1500 meters. The distribution is rather limited. So far, specimens have been collected only from the southeastern region of Yunnan between Long. 103° and 105° E. and Lat. 22°50' and 23°30' N. Our material exhibits very little variation even in the vegetative characters. Compared with the isotype, the base of some leaves may be subcordate rather than round, occasionally the upper surface of the leaves may be more or even less verruculose, the pubescence on the lower surface may be brown rather than white, and between these hairs there may be fewer glands. It seems that all these variations may be attributed to the age of the plants, the size of the leaves, or even to the pressing and drying processes in the preparation of the specimens.

## EXPLANATION OF PLATES

### PLATE I

*Styrophyton caudatum* (Diels) S. Y. Hu: FIG. 1. A fruiting branch ( $\times \frac{1}{2}$ ), the indumentum omitted. FIG. 2. A fruit ( $\times 5$ ). FIG. 3. The same, longitudinal section, lower portion not through the center of the fruit ( $\times 10$ ). FIG. 4. Cross-section of a young fruit ( $\times 10$ ). FIG. 5. A flower ( $\times 5$ ). FIG. 6. The same with part of the calyx tube, petals and stamens removed ( $\times 5$ ). FIG. 7. Some seeds ( $\times 12$ ).

### PLATE II

FIG. 1. Fruit of *Blastus fengii* S. Y. Hu ( $\times 3$ ), with seeds in lateral view ( $\times 10$ ). FIG. 2. Habit sketch of *Medinilla nana* S. Y. Hu ( $\times 2$ ), with seeds ( $\times 10$ ). FIG. 3. Seed of *Cyphotheca montana* Diels ( $\times 10$ ), side and front views. FIG. 4. Seed of *Oxyspora paniculata* DC. ( $\times 12$ ). FIG. 5. Longitudinal section of the fruit of *Pachycentria fengii* S. Y. Hu ( $\times 6$ ). FIG. 6. Fruit of the same ( $\times 5$ ), with persistent calyx, each lobe of which has a small hook on the back. FIG. 7. Cross-section of the ovary of the same, diagrammatic. FIG. 8. Seeds of *Pachycentria fengii* S. Y. Hu ( $\times 5$ ). FIG. 9. Seeds of *Sonerila yunnanensis* J. Jeffrey ( $\times 10$ ). FIG. 10. A flower of *Cyphotheca hirsuta* S. Y. Hu ( $\times 3$ ), with 1 petal and 1 smaller stamen removed. FIG. 11. Seed of *Plagiopetalum henryi* (Kränzl.) S. Y. Hu ( $\times 10$ ).

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.



HU, NOTES ON THE FLORA OF CHINA, II





HU, NOTES ON THE FLORA OF CHINA, II

## SPONTANEOUS WHITE PINE HYBRIDS

ALBERT G. JOHNSON

*With two plates*

A NOTEWORTHY FEATURE of the genus *Pinus* L. is the relative abundance of both natural and artificial hybrids. Summaries of known crosses published in recent years include hybrids within both of the subgenera *Haploxylon* Koehne and *Diploxylon* Koehne, usually within the series limits of these subgenera; cf. L. P. V. Johnson (3), Richens (5), Righter and Duffield (6). The hybrids to be described here are hitherto unreported in the subgenus *Haploxylon*.

In the spring of 1949 a five-needled pine growing in the Hunnewell Arboretum, Wellesley, Massachusetts, was observed to differ markedly from the familiar native white pine, *Pinus strobus* L.; and yet it was evidently not one of the known cultivated species of this group of pines. The tree, about twenty years old, twenty-five feet high, and fourteen inches d. b. h., is, in the opinion of Mr. Walter Hunnewell, of spontaneous origin, inasmuch as he has no record nor recollection of it having been planted. Apparently it is a chance seedling which has grown up since annual mowing was discontinued in the Arboretum about 1930. It has been allowed to remain because of its unusually attractive blue-green foliage.

The tree is a vigorous and rank grower of loose open habit. This rapid growth capacity plus the effect of repeated weevil damage has caused it to develop a broad crown with several leaders. Although generally resembling our native white pine it differs in the curved and twisted blue-green foliage, the more massive cones, the larger, purple-brown seeds, and the scaly brown bark. The flowers at the time of initial observation were seen to differ from those of white pine in both position and color. The red female flowers were borne from top to bottom of the tree, while on white pine they rarely are found except in the topmost branches. The flesh-colored male flowers were few and borne in elongated clusters instead of in yellow compact bunches as in white pine. Subsequent examination of the pollen showed it to be 23% defective.

The presence in the Arboretum of *P. parviflora* Sieb. & Zucc. and of *P. parviflora* var. *pentaphylla* Henry, both of which have flowering habits similar to the tree in question, suggested the possibility of hybridization with the native white pine, which is abundant on the grounds. Since the difference between *P. parviflora* and its variety *pentaphylla* is slight and of such a nature as to be obscured in a hybrid, the latter taxon is not being considered as distinct for the purposes of this paper. Moreover, the location of this varietal form in respect to the other trees in the Arboretum substantially reduces the probability of it having had a rôle in the induction of this presumed hybrid or of others discovered later.

Careful comparison of the characteristics of the tree in question with both *P. strobus* and *P. parviflora* supports the hybrid hypothesis. To facilitate comparison of the parental and hybrid forms a hybrid index has been prepared, TABLE I, after the manner of Anderson (1). In making up such an index the characters of diagnostic value of one species are arbitrarily assigned a value of 0, while the corresponding ones of the second species are assigned values of 1 or more, according to their relative importance in separating the two species. Since the genetic bases for most of the characters utilized in this particular instance are still imperfectly understood, the values assigned to the second species have in most cases been kept relatively low. Values for the corresponding traits in the putative hybrid are then determined by interpolation according to the degree of resemblance to one parent species or the other. The summation of these individual values provides an index number for the particular plant indicative of its relative resemblance to one parental species or the other. Such indices are of greatest value, of course, in population studies, where they can assist in the detection of  $F_2$  segregates and backcross individuals, but they are also useful tools for presenting quantitatively conclusions necessarily of a subjective nature, as in the case of the present hybrid, where the summation of its various index values shows it to resemble *P. parviflora* slightly more than *P. strobus*.

The reference to odor in the hybrid index table should perhaps be elaborated, since it is a useful tool in identifying certain pines and the probable parentage of certain hybrids. *Pinus parviflora* branches, when broken, emit a strong and apparently highly specific odor suggestive to some people of bruised tomato plants. This odor is present in induced hybrids of this species with *P. strobus* and *P. monticola* growing at the Arnold Arboretum, and is present in the suspected hybrid under discussion and in other individuals found later. Mirov (private communication) has suggested that the terpenes and sesquiterpenes of *P. parviflora* which he and his co-workers have recently analyzed (2) may predominate in the hybrid over the simple pinene mixture found in *P. strobus* (4). A comparable situation exists in the hybrid between *P. ponderosa* Laws. and *P. jeffreyi* Grev. & Balf., in which the terpenes of *P. ponderosa* predominate over the simple n-heptane of *P. jeffreyi*, although the turpentine of both parental species occur in the hybrid.

With the establishment upon a reasonable basis of the probable hybridity of the tree, it still remained necessary to determine whether the cross occurred as *P. strobus*  $\times$  *parviflora* or as the reciprocal cross. Several factors favor the first assumption. The position of the hybrid in relation to the probable parent trees suggests that it originated as a wind-borne seed from a near-by *P. strobus*. An essentially wingless seed of *P. parviflora* would have had to be carried by an animal agency nearly twice that distance to the site of the hybrid. The later finding of additional individuals of this hybrid, one of which is almost directly below the probable mother tree, adds further evidence in favor of this parentage. The comparatively poorer showing in vigor and growth rate of two reciprocal hybrid indi-



TABLE 1

| SPECIES                    | LEAF<br>LENGTH            | LEAF<br>SHAPE                        | ♂<br>STROB-<br>ILI                      | ♀<br>STROB-<br>ILI         | PE-<br>DUN-<br>CLE          | LENGTH<br>OF<br>SEEDS | SEED<br>WING | SEED<br>COLOR          | SEED<br>SHELL        | No. OF<br>CONE<br>SCALES<br>AVER. | Odor                          | No. OF<br>SEEDS<br>PER<br>GRAM | BARK                            | SUM OF<br>INDEX<br>VALUES |
|----------------------------|---------------------------|--------------------------------------|---|----------------------------|-----------------------------|-----------------------|--------------|------------------------|----------------------|-----------------------------------|-------------------------------|--------------------------------|---------------------------------|---------------------------|
| <i>Pinus strobus</i>       | (0)<br>6-14<br>cm.        | (0)<br>straight                      | (0)<br>yellow<br>clus-<br>tered         | (0)<br>cream<br>or<br>pink | (0)<br>long                 | (0)<br>5-7<br>mm.     | (0)<br>long  | (0)<br>light<br>brown  | (0)<br>thin          | (0)<br>38                         | (0)<br>pleas-<br>ant          | (0)<br>53.08                   | (0)<br>rough<br>purple<br>brown | (0)                       |
| × <i>P. hun-<br/>nelli</i> | (1)<br>7.5-<br>8.5<br>cm. | (1)<br>curved<br>slightly<br>twisted | (2)<br>pink<br>elong.<br>clus-<br>tered | (2)<br>red-<br>dish        | (1)<br>sub-<br>ses-<br>sile | (1)<br>7-9<br>mm.     | (0)<br>long  | (2)<br>purple<br>brown | (1)<br>thick         | (1)<br>30                         | (3)<br>dis-<br>agree-<br>able | (3)<br>13.88                   | (1)<br>scaly<br>brown           | (19)                      |
| <i>P. parvi-<br/>flora</i> | (2)<br>2-3<br>cm.         | (2)<br>curved<br>twisted             | (3)<br>pink<br>elong.<br>clust.         | (3)<br>red                 | (2)<br>ses-<br>sile         | (2)<br>10-12<br>mm.   | (2)<br>short | (2)<br>purple<br>brown | (2)<br>very<br>thick | (3)<br>13                         | (3)<br>dis-<br>agree-<br>able | (4)<br>4.58                    | (2)<br>scaly<br>brown           | (32)                      |

viduals at the Arnold Arboretum adds further support to this viewpoint and suggests that some real difference in the reciprocal hybrids may in fact exist. Also it is reported to be much easier to induce the hybrid *P. strobus*  $\times$  *parviflora* than the reciprocal hybrid (J. W. Wright, private communication).

As already indicated, additional individuals of the hybrid have been found. The second was discovered in the spring of 1951 about two hundred feet from the site of the first tree and only a short distance from the probable female parent, a large white pine thirty inches in diameter. This hybrid tree, designated for purposes of reference as Hunnewell #2, is about the same age as the first (Hunnewell #1) but is slightly smaller, twelve inches d. b. h. and twenty-two feet high. Like #1, it is rank-growing and multiple-stemmed, again in part because of its inherent vigor and in part due to repeated weevil damage. In details of foliage and cones it does not differ materially from hybrid #1.

Following the discovery of this second hybrid a systematic search of the grounds of the Arboretum was made to see if other hybrid individuals might exist. Additional specimens were found and numbered in order of discovery as #3, #4, #5, and #6. Tree #3 was later rejected as a probable hybrid between *P. peuce* Griseb. and *P. parviflora* and will be dealt with independently. To avoid any confusion, however, the original numbers assigned to the remaining hybrids were retained.

The fall of 1951 provided the first opportunity to collect any number of cones from the two largest trees. The three smaller ones did not produce a sufficient number to warrant collection for seed production analysis. In each case, however, enough were found to supply herbarium material for comparative purposes. Although badly hit by cone weevils, *Conophthorus coniperda*, the first tree yielded sixty-two sound cones and the second seventeen. In neither case did this represent the total production of the tree but instead the more accessible sound cones. These were collected when mature and just beginning to open on September 7. The two lots of cones were kept separate, allowed to dry, the seed extracted, cleaned, counted, and weighed. The good seed was found to be readily separable from the empty seeds by water flotation, which allowed the latter to be skimmed off the surface of the water while the filled seed sank to the bottom of the container. In both cases the proportion of good seed was low, being but 0.9% and 1.6% respectively in trees #1 and #2. If the percentage of good seed is calculated on the basis of the potential seed production from the average number of functional scales per cone the figures are further reduced to 0.1% and 0.4%, since many scales yielded nothing but empty wings, possibly due to lack of pollination. The seeds produced were large and relatively thick-shelled. While resembling *P. parviflora* in these respects, the seed wing was of the long functional type of *P. strobus*. The seeds weighed about four times as much as those of *P. strobus* and one third as much as those of *P. parviflora*.

As was pointed out earlier, 23% of the pollen of hybrid #1 was abortive upon visual examination. That of tree #2, however, appeared wholly

sound. No germination test was undertaken with either pollen lot, so probable functionability is not known. In both of these trees the amount of pollen produced was so low in 1951 as to virtually eliminate the possibility of any significant amount of self-pollination taking place. In the case of tree #1 similar low pollen production was observed in 1949 and 1950. In fact, in 1950 scarcely any pollen could be found despite a very heavy production of female flowers. This phenomenon of disproportionate female flower production is frequently observed in vigorous young pines and may in part explain the poor seed yield from the cones of such trees. This point was emphasized in the experience of the writer in the fall of 1950 while collecting pines in southern Mexico. On one occasion a considerable number of cones were collected from a small grove of young and extremely vigorous trees of *P. ayacahuite* var. *veitchii* Shaw. The cones of this species are massive and while green are the equivalent in size and weight to quite respectable pieces of stove wood, so that some considerable effort was involved in transporting the cones down the mountain to the car. When processed some months later, all were found to be devoid of good seed.

Inasmuch as this hybrid between the native white pine and the Japanese white pine has occurred at least five times and apparently is capable of recurring repeatedly as long as the parent species remain in close proximity to each other, it seems appropriate to designate it with a specific title in honor of Mr. Hunnewell, a lifelong friend of the Arnold Arboretum and an ardent horticulturist.

× *Pinus hunnewelli* hyb. nov. (*P. strobus* L. × *P. parviflora* Sieb. & Zucc.).

Arbor hybrida fertilis habitu corticeque *P. parviflorae* similis; a *P. parviflora* differt foliis longioribus, strobilis longioribus, seminibus minoribus ala elongata donatus; a *P. strobo* differt ramulis puberulentis, foliis brevioribus, strobilis subsessilibus, apophysis firmioribus crassioribus glaucis; seminibus majoribus.

TYPE: a specimen from hybrid #1 deposited in the herbarium of the Arnold Arboretum.

This hybrid swarm, although limited to small numbers, illustrates the breakdown of a geographically imposed isolating barrier to genic exchange through the chance migration of one species, in this case through the agency of man, into contact with another closely related one. The production of fertile hybrids exemplifies the first stage of introgression of *P. parviflora* genes into *P. strobus* and provides the tree breeder, incidentally, with the most important tool of his trade, the  $F_1$  hybrid, with which to produce backcross and  $F_2$  generations. From this point of view the discovery of these trees is of considerable value, since they can save the geneticist many years of waiting for artificially induced hybrids of this nature to reach sexual maturity.

The hybrid vigor so apparent in this hybrid has been observed in two



cases to lead to the forking of the branches at a point between the whorls, and in one case to the production of a forked cone (PLATE 2). Also apparently associated with this hybrid vigor is a snakelike or looping type of growth which may be responsible in some degree for the poor form of the trees. The observed tendency of the lowermost branches of the Hunnewell hybrids to turn up and develop leaders has also been noted in specimens of *P. monticola*  $\times$  *strobis* and *P. monticola*  $\times$  *parviflora* growing at the Arnold Arboretum. In each case the tendency appears to be associated with the other manifestations of hybrid vigor, and unless closely planted or systematically pruned these trees will inevitably develop multiple and forked trunks. Such undesirable by-products of the heterotic phenomenon suggest the need of considerable caution in its direct application to the problems of forest-tree breeding. Improperly utilized it could quite conceivably discredit considerably the youthful tree-breeding science through the production of coarse, unmarketable trees, in much the same manner as the use of exotic species has fallen into disrepute in the United States largely because of the failure to take into account the need for assessment of the variability within a species chosen and the necessity of choosing a variety adapted to the conditions under which it must grow.

Both hybrids #1 and #2 have been propagated by grafting upon young specimens of *P. strobis*. Hybrid #1 was first so propagated on a small scale in 1950 and in 1951 the three surviving grafts of the original five produced six, eight, and eight female strobili respectively and an unexpectedly large number of male flowers. Additional grafts of this plant were made in 1951. Tree #2 was not discovered until after growth had started in 1951, and to propagate it without loss of a season soft wood scions were used upon the new growth of potted white pines. Further propagation is planned of all five individuals of the Hunnewell pine, as well as of the *P. peuce*  $\times$  *parviflora*.

### SUMMARY

A small hybrid swarm of *Pinus strobis*  $\times$  *parviflora* is described and the type individual designated as  $\times$  *P. hunnewelli*. This hybrid is noteworthy as potential breeding stock for incorporating genes of *P. parviflora* into *P. strobis*. It displays marked heterosis and is promising as an ornamental because of its attractive foliage. The hybrid is at least partially fertile and is readily propagated by common grafting techniques. A second hybrid between *P. peuce* and *P. parviflora* is referred to, but the description is withheld pending confirmation of the female parentage.

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## EXPLANATION OF PLATES

### PLATE I

Cones, leaves, and seeds of *Pinus parviflora* Sieb. & Zucc.,  $\times$  *P. hunnewelli* hybr. nov., and *P. strobus* L. FIGS. 1, 2, & 3, *P. parviflora*. FIGS. 4, 5, & 6,  $\times$  *P. hunnewelli*. FIGS. 7, 8, & 9, *P. strobus*.

### PLATE II

Abnormalities of cone and branch structure of  $\times$  *Pinus hunnewelli*, apparently associated with the expression of hybrid vigor. FIG. 1, Cone forked near base. FIG. 2, Branchlet showing forking between nodes.

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JOHNSON, SPONTANEOUS WHITE PINE, HYBRIDS





JOHNSON, SPONTANEOUS WHITE PINE HYBRIDS

STUDIES IN THE THEACEAE, XXVI  
THE GENUS *VISNEA* \*

CLARENCE E. KOBUSKI

THE GENUS *Visnea* was first described by Linnaeus f. (Suppl. Pl. 36. 1781), and on a later page (251) of the same publication the author recorded the species *V. mocanera*. The specific name refers to the *mocan* of the Guanches, or ancient inhabitants of the Canary Islands, who made from the plant a kind of syrup which was much used with their daily food and in medicines. It is thought that *V. mocanera* is the plant referred to as "mocan." A second generic name, *Mocanera*, was introduced by Jussieu (1789), who actually recognized the existence of the previously described *Visnea*. However, no serious question of nomenclature ever evolved, since *Mocanera* became only a little-used synonym and never challenged the priority of *Visnea*. To this day no other species has been added to the genus.

Originally the species was described from the Canary Islands, and it has been recorded from most of the group, quite extensively from Gran Canary, Teneriffe, Gomera, Palma, and Ferro. It was at first thought that the Canary Islands encompassed the complete range of the species. However, Johnson (Hooker's Jour. Bot. 9: 161. 1857) reported the species as growing in the northwestern portion of the islands of Madeira between the Ribeira da Janella and the Ribeiro do Inferno. From the works of other authors one may assume that this small area originally mentioned in Johnson's work shows the distribution of the species on Madeira.

It appears that the species is usually found growing in rather wild and inaccessible places. On Madeira its habit is that of a shrub, while in the Canary Islands it more often attains the stature of a small tree.

There seem to have been considerable question and also several suggestions regarding the correct position and relationships of the genus. Endlicher (Gen. Pl. 1018. 1840) first placed it in the Theaceae, but later in the second supplement of the same publication (Suppl. 2, 81. 1842) considered it as belonging to the Ebenaceae. Johnson (1857) suggested a relationship with the genus *Clethra* and suggested *Visnea* as "another link of connection between Ericaceae and Vacciniaceae." However, by 1885 Johnson appears to have changed his opinion, since he treated the genus in his Handbook of Madeira under the Theaceae.

In 1859, two years after Johnson's original article appeared, Schacht (Denkschr. Bot. Ges. Regensburg 4: 47-60, t. 1, 2. 1859), from material sent by Johnson, offered a detailed discussion on the status of *Visnea*.

\* This genus was studied originally with the oriental genus *Anneslea*, and a publication comprising the two genera was planned. However, as the study progressed, it was decided to treat the two separately.

This last work was undoubtedly based to a considerable extent on the previous work of Johnson. No definite conclusions were offered. It is interesting to note that in the plates, which are very well done as a whole, the anthers are depicted with almost pore-like openings rather than longitudinal slits.

Toward the end of the nineteenth century botanists in general accepted *Visnea* as belonging to the Theaceae. Szyszyłowicz (1895) and Melchior (1925), in their respective treatments of the family in *Die Natürliche Pflanzenfamilien*, both placed *Visnea*, without reservation, in the Theaceae. They placed it in the tribe Ternstroemieae along with *Adinandra*, *Ternstroemia*, and *Eurya*.

Most botanists, it seems, have interpreted the ovary as inferior or half-inferior. This interpretation stems from the fact that the persistent calyx-lobes are joined at the base, and in the development of the fruit this fused basal portion of the calyx is adnate to the side of the fruit. This appears very much like an inferior ovary, except that the fruit, when dissected longitudinally, shows a clean demarkation from the calyx-lobes in the line and character of the pericarp, which is distinct and not fused with the calyx.

In the flower, the ovary appears to be placed on the torus formed with the base of the connate calyx-lobes, but retains its individual identity. Some authors have described the ovary as projecting "lightly" into the torus. I could detect no projection into the torus from the dissections I made and studied. It does appear, however, that in the development of the fruit and the persistent calyx, the base of the fruit does project somewhat into the torus, but, as I mentioned above, retains its individuality.

*Visnea* Linnaeus f., Suppl. Pl. 36. 1781. — Endlicher, Gen. Pl. 1018. 1840; Suppl. 2, 81. 1842. — Webb & Berthelot, Hist. Nat. Iles Canar. 3 (2): 144. 1842. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève 14: 130 (Mém. Ternstr. 42). 1855. — Johnson in Hookers Jour. Bot. 9: 161. 1857. — Schacht in Denkschr. Bot. Ges. Regensburg 4: 47-60, t. 1, 2. 1859. — Bentham & Hooker, Gen. Pl. 1: 182. 1862. — Baillon, Hist. Pl. 4: 257. 1873. — Szyszyłowicz in Nat. Pflanzenfam. III. 6: 190. 1895. — Hubbard in Bailey, Stand. Cyclop. Hort. 6: 3480. 1917. — Engler in Veg. Erde [Pflanzenwelt Afr. 3 (2)] 9: 494. 1921. — Melchior in Nat. Pflanzenfam. ed. 2, 21: 145. 1925. — Lemée, Dict. Pl. Phan. 6: 877. 1935.

*Mocanera* Jussieu, Gen. Pl. 318. 1789. — Lamarck, Encycl. 4: 208. 1797. — Jussieu in Dict. Sci. Nat. 31: 504. 1824. — Non *Mocanera* Blanco, Fl. Filip. 446-451, 858. 1837.

Flowers axillary, hermaphroditic. Bracteoles 2. Sepals 5, imbricate, connate at the base forming a shallow tube adnate to the base of the ovary. Petals 5, imbricate, connate at the base. Stamens 12 [-21], adhering to the base of the corolla; filaments free; anthers basifixed, erect. Ovary 3-celled, lightly immersed in the torus; ovules few in each cell, pendant



from the apex; styles 3, distinct, persistent. Fruit baccate, indehiscent, projecting into the torus, nearly enclosed and adjoined near the base by the persistent calyx, *appearing* subinferior. Seeds small, pyriform, 3-angled, the embryo curved, cylindrical, the albumen pulpy.

Evergreen trees with small flowers.

TYPE SPECIES: *Visnea mocanera* Linn. f.

DISTRIBUTION: Canary Islands and Madeira.

**Visnea mocanera** Linnaeus f., Suppl. Pl. 251. 1781. — Willdenow, Sp. Pl. 2: 926. 1800. — Bory de St.-Vincent, Essai Iles Fortunées 327, t. 7. 1804. — Colla, Hort. Repul. 146, t. 32. 1824. — Sprengel, Syst. Veg. 2: 465. 1825. — Hooker, Icon. Pl. 3: t. 253. 1840. — Walpers, Repert. Bot. Syst. 1: 368. 1842. — Webb & Berthelot, Hist. Nat. Iles Canar. 3 (2): 145, t. 69 B. 1842-44. — Choisy in Mém. Soc. Phys. Hist. Nat. Genève 14: 130 (Mém. Ternstr. 42). 1855. — Walpers, Ann. Bot. Syst. 7: 360. 1868. — Johnson, Handb. Madeira 220. 1885. — Nicholson, Illustr. Dict. Gard. 4: 185, f. 200, 1886. — Szyszylowicz in Nat. Pflanzenfam. III. 6: 190. 1895. — Thonner, Blütenfl. Afr. t. 99. 1908; Fl. Pl. Afr. t. 98. 1913. — Pitard & Proust, Fl. Iles Canar. 134. 1908. — Menezes, Fl. Arch. Madeira 30. 1914. — Hubbard in Bailey, Stand. Cyclop. Hort. 6: 3480. 1917. — Knoche, Vagandi Mos (Die Kanarische Ins.) 220, t. 17. 1923. — Melchior in Nat. Pflanzenfam. ed. 2, 21: 145. 1925. — Lindiger, Beitr. Kennt. Veg. Fl. Kanar. Ins. 278. 1926.

*Mocanera canariensis* Heynhold, Nom. Bot. Hort. 1: 884. 1840, *nom. nud.* — Jaume St.-Hilaire, Expos. Fam. Nat. 2: 371. 1805. — Jussieu in Dict. Sci. Nat. 31: 505. 1824.

Small tree or shrub. Branches brown or grayish brown, terete, glabrous, lenticellate, the young branchlets brown, angled, pubescent when very young. Leaves coriaceous, subelliptic-obovate, 4-7 cm. long, 2-2.5 cm. wide, glabrous (except when very young), acute at the apex, cuneate at the base, the margin subrevolute, serrulate along the upper half, a gland (quickly caducous) to each serration, the veins obscure on both surfaces, occasionally visible below, the midrib 2-3 (-4) mm. long. Flowers axillary, solitary or in twos, occasionally in fascicles of three; pedicel terete, 7-8 mm. long, lightly pubescent at anthesis (lens); bracteoles 2, ovate or long-deltoid, unequal, 1.25-1.5 mm. long, one bracteole immediately below the calyx, the other disposed along the pedicel away from the calyx, rarely opposite; calyx-lobes 5, imbricate, coriaceous, persistent, unequal, glabrous (lightly pubescent at anthesis), 3-5 mm. long, 2.5-2.75 mm. wide, joined at the base for 1.5-2 mm. forming a torus; corolla-lobes 5, imbricate, obtuse, membranaceous, 5-6.5 mm. long, 3.5-4 mm. wide, joined at the very base; stamens ca. 13 [-21], ca. 4 mm. long, unequal, the filament ca. 3 mm. long, free, lightly adnate to the base of the corolla, the anthers long-ovate ca. 1 mm. long, projected into an apicule; ovary subglobose to conical, lightly imbedded in the torus, ca. 1.5 mm. diameter,

sulcate and glabrous near the base, densely pubescent above, 3-celled, the ovules few, the styles 3, filiform, persistent, ca. 3 mm. long, free nearly to the base, pubescent, the stigmas punctiform. Fruit baccate, indehiscent, conical, crowned by the persistent styles, during development projecting more deeply into the torus, the cells often indistinguishable, appearing one-celled, crowded with pulp, 1-4-seeded, others abortive. [Seeds 3-angled pyriform, acute, the testa glutinous-granulate].

CANARY ISLANDS: TENERIFFE: above Taganana, in forest, alt. 900 m., *A. Engler s.n.* (AA). — "Cruz de Taganana, Cumbre, in rupibus," alt. 900 m., *J. Bornmüller* 927 (AA), June 14, 1900. — Guinar, river ravine, alt. 700-800 m., *O. Burchard* 62 (AA), Feb. 1904. — Guinar, river ravine, alt. 500 m., *J. Bornmüller* 2588 (AA), Sept. 6, 1901. — In woods, *C. Bolle s.n.* (G), in 1851. PALMA: near Breña Baja, Montagneta, alt. 500 m., *J. Bornmüller* 2586 (AA), May 10, 1901. FERRO: El Golfo, Vueltas above the church, *R. T. Lowe H* 178 (G), Feb. 18, 1858. — Risco de Jinama, alt. 500-600 m., *J. Bornmüller* 2589 (AA), May 17, 1901.

MADEIRA: Ribeiro do Inferno, *W. Barbey* 908 (G), Dec. 16, 1858.

CULTIVATED: T e n e r i f f e : Oratava, in garden, *J. Bornmüller* 925 (AA), July 1900. — F r a n c e : Antibes (Alpes-Maritimes), Villa Thuret (AA), Mar. 12 & Apr. 10, 1889.

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## THE GENUS AMENTOTAXUS

HUI-LIN LI

*Amentotaxus* is a coniferous genus, of isolated position, endemic to eastern Asia; there are considerable differences of opinion regarding its proper phylogenetic alliance. The genus has long been considered monotypic. Its species, *A. argotaenia* (Hance) Pilger, was first proposed as a species of *Podocarpus*, having been based on sterile material. Later Pilger transferred it to *Cephalotaxus* (in Engler, Pflanzenr. IV. 5: 104. 1903), but it was subsequently referred to a separate genus by him (in Bot. Jahrb. 54: 41. 1916) because of its very distinct long staminate inflorescences. In Pilger's system of 1926 (Engler & Prantl, Nat. Pflanzenfam. ed. 2. 13: 267. 1926), *Amentotaxus* is placed in the Cephalotaxaceae, the only other genus of which is *Cephalotaxus*. As *Amentotaxus* is very different from *Cephalotaxus*, Kudo and Yamamoto (in Jour. Soc. Trop. Agr. Formos. 3: 110. 1931) proposed for it the monotypic family Amentotaxaceae. Florin (Palaeontographica 85, Abt. B: 625-630. 1944; Bot. Gaz. 110: 31-39. 1948), however, is of the opinion that *Amentotaxus* is not closely related to the Cephalotaxaceae but rather to the Taxaceae. Accordingly, in the latest system of classification of the conifers by Janchen (in Sitz. Oest. Akad. Wiss. Math.-Nat. Kl. Abt. I. 1949(3): 155-162. 1950), it is placed with *Torreya* in the tribe Torreyae of the Taxaceae, while *Cephalotaxus* is considered as representing the monotypic family Cephalotaxaceae. On the basis of both the vegetative and reproductive structures, this disposition is probably the most commendable.

The varied opinions regarding its phylogenetic position show that *Amentotaxus* is of great morphological interest. Also of considerable interest is its geographical distribution. First discovered around Hongkong and in Kwangtung, in southern China, the genus was subsequently reported to occur in southern Formosa, western Hupeh and Szechuan, southern Yunnan, and Tonkin. These later records all attribute the plants from these widely separated localities to a single species. In all cases, the authors recording these findings have apparently studied only local material, and a comprehensive review of the genus, with specimens representative of all localities, has never been made. Although the number of specimens from the different localities now available is still rather few and in some cases inadequate, apparently due to the plants being of rare occurrence, a study shows that the genus is not monotypic, but is rather composed of several distinct entities, each possessing distinct morphological characteristics and an exclusive as well as isolated and restricted range. In other coniferous genera with similar disjunct ranges, such as *Taiwania*, the disjunction is found to be specific in nature. Plants of these remote locations have long been isolated and have undergone considerable



differentiation, so that they are recognizable as morphologically and taxonomically distinct entities, here interpreted as species.

The chief differentiating characters among the species are the size and shape of leaves and the relative width of the stomatal bands. Apparently the number of staminate racemes and the size and shape of the mature seeds are also good taxonomic characters. Unfortunately, as most of the specimens now available are sterile, these latter important characters are not revealed in all species. However, the stomatal bands on the under-surface of the leaves are especially conspicuous and strikingly distinct, especially in combination with other characters, rendering the differentiation of species very certain even when the locality of a given specimen is not indicated. The width of the stomatal bands and the proportion of these to the marginal green bands are very constant among plants of the same general region, that is, of the same species. While only one collection of the genus in Yunnan is so far noted, a larger and more complete series of Formosan specimens is available for study. In all cases, the stomatal bands are of nearly uniform width among plants of the same general range, clearly indicating the taxonomic dependability of this character.

As a result of this study, four species are recognized: one, the type species, occurring in Kwangtung, one in southern Formosa, one in Hupeh-Szechuan, and one in southern Yunnan and possibly also in northern Tonkin. These species all occur at medium to high altitudes, varying from 300 to 1600 meters, in ravines and on rocky cliffs, mostly in shady damp situations or sometimes along borders of streams. They are not only of very restricted range but also of rare occurrence, probably an indication that these ancient plants are on the verge of becoming extinct. As the species are highly ornamental because of their striking foliage, and as they are also of great botanical interest, it would be desirable to exert more effort toward bringing them into cultivation.

The material utilized in this study is deposited at the following herbaria, listed with respective abbreviations used for cited specimens: AA = Arnold Arboretum; NTU = National Taiwan University, Formosa; US = U. S. National Herbarium.

I am indebted to the officials of these institutions for permission to study specimens in their care, and to Dr. A. C. Smith, U. S. National Museum, for reading the manuscript and offering suggestions.

**Amentotaxus** Pilger in Bot. Jahrb. 54: 41. 1916

Evergreen shrubs or small trees, glabrous, the branchlets opposite, terete or more or less quadrangular, patent or ascending. Leaves persistent toward the upper part of the branchlets, sessile, subsessile, or very shortly petiolate, opposite, coriaceous, decurrent, linear-lanceolate, usually acutish at apex, with a prominent or subprominent costa, green above, with 5 distinct longitudinal bands beneath, the costal and marginal bands pale or silvery green, alternating with 2 broad whitish stomatal bands. Flowers dioecious, on the year's branchlets. Staminate inflorescences of 2-4

(rarely 1 or 5) spike-like racemes, long and more or less pendulous, short-pedunculate, in the axils of imbricate bracts, the flowers composed of fasciculate stamens of peltate or subpeltate short-stipitate scales, the anther-cells 2-8, ovoid. Ovulate flowers solitary, in the axil of a lateral bract, on short thick to long slender pedicels, the ovule solitary, erect, subtended by minute imbricate scales below. Seeds solitary, large, drupe-like, ovoid or ellipsoid, surrounded by a reddish yellow aril open at the apex, subtended by several persistent scales at base.

TYPE SPECIES: *Amentotaxus argotaenia* (Hance) Pilger.

Four species in eastern Asia.

As all previous references pertain to a single species, the synonymy given below is adjusted on the basis of the specimens cited or locations attributed. Pilger, the author of the genus, erroneously credited the species *Amentotaxus argotaenia* (in Engler & Prantl, Nat. Pflanzenfam. ed. 2. 13: 268. 1926) to western China only, while actually the type locality is in southern China. His description, which is rather brief, is based on composite elements from different localities, the staminate characters on the basis of only one collection, *Westland* from Taimo Mountains opposite Hongkong, and the ovulate characters on the basis of a single flower from *Wilson 3005* from an unspecified locality in western China.

#### KEY TO THE SPECIES

- A. Stomatal bands white, as broad as or narrower than the outer green marginal bands.
    - B. Leaves comparatively short, 4-7 cm. long, straight, rarely slightly falcate, acute to obtuse at apex; stomatal bands as broad as the green marginal bands. .... 1. *A. argotaenia*.
    - BB. Leaves longer, 6-11 cm. long, mostly falcate, sometimes straight, long-acuminate at apex; stomatal bands about  $\frac{2}{3}$  as broad as the green marginal bands. .... 2. *A. cathayensis*.
  - AA. Stomatal bands white or brownish, 2 or more times as broad as the outer green marginal bands.
    - B. Leaves comparatively long and narrow, 5-8.5 cm. long, 7-9.5 mm. broad, mostly slightly falcate, the base acute to obtuse; stomatal bands white, twice as broad as the marginal bands. .... 3. *A. formosana*.
    - BB. Leaves shorter and broader, 3-7 cm. long, 8-11 mm. broad, usually straight; the base broadly acute to subrounded; stomatal bands brownish or yellowish white, 2.5-3 times as broad as the green marginal bands. .... 4. *A. yunnanensis*.
1. *Amentotaxus argotaenia* (Hance) Pilger in Bot. Jahrb. 54: 41. 1916, p. p. (quoted plants from Kwangtung and Hongkong).
- Podocarpus argotaenia* Hance in Jour. Bot. 21: 357. 1883; Masters in Jour. Linn. Soc. Bot. 26: 547. 1902, p. p.; Dunn & Tutchner in Kew Bull. Misc. Inf. Add. Ser. 10: 256. 1912.

*Podocarpus insignis* Hemsl. in Jour. Bot. 23: 287, 312. 1885.

*Cephalotaxus argotaenia* Pilger in Engler, Pflanzenr. IV. 5: 104. 1903; Patschke in Bot. Jahrb. 48: 629. 1913.

Shrub, 2–4 m. high; branchlets spreading or sometimes ascending, subterete or quadrangular; leaves thickly coriaceous, subsessile to very shortly petiolate, linear-lanceolate, generally straight, sometimes slightly falcate toward the tip, 4–7 cm. long, 6.5–8.5 mm. broad, acute to obtuse at apex, cuneate at base, slightly revolute at margins, green above, the costa prominent and raised above, scarcely raised beneath, 1–1.5 mm. broad, the stomatal bands whitish to silvery whitish, 1.5–1.8 mm. broad, about as broad as the marginal bands, the marginal bands pale silvery green, 1.3–2 mm. broad; petioles thick, scarcely 1–1.5 mm. long; staminate racemes subterminal or lateral, solitary or 2 or 3 together, in the axils of minute scales, short-pedunculate, more or less pendulous, 5–6.5 cm. long, the flowers composed of subfasciculate peltate or subpeltate stamens, the filaments short, the anther-cells 2–5, mostly 3, ovoid; ovulate flowers and mature seeds unknown.

Kwangtung Province at Lofaushan Mountains, and also around Hongkong, in wet rocky situations or along edge of streams, at altitudes of 600–1500 meters.

CHINA: Kw a n g t u n g : Lofaushan (type locality), *Levine & McClure* 704 (US), *C. O. Levine* 1502 (AA, US). H o n g k o n g : Lantao Island, *Hongkong Herb.* 2068 (AA).

The specimens examined are all sterile. The only staminate specimen known is the type of *Podocarpus insignis*, *Westland s. n.* from Taimo Mountains opposite Hongkong, the basis of descriptions by both Hemsley and Pilger. The type of *Podocarpus argotaenia* Hance is a sterile specimen of E. Faber, Sept. 1882, from Lofaushan, Kwangtung, in the British Museum (Natural History).

## 2. *Amentotaxus cathayensis* sp. nov.

*Cephalotaxus argotaenia* Pilger in Engler, Pflanzenr. IV. 5: 104. 1903, p. p.; Rehder & Wilson in Sarg. Pl. Wils. 2: 6. 1916 (excl. syn.).

*Amentotaxus argotaenia* Pilger in Bot. Jahrb. 54: 41. 1916, p. p. (quoted plants collected by Wilson), in Engler & Prantl, Nat. Pflanzenfam. ed. 2. 13: 270. 1926.

*Podocarpus argotaenia* sensu Masters in Jour. Bot. 41: 269. 1903, in Jour. Linn. Soc. Bot. 37: 414. 1906; non Hance.

Frutex vel arbuscula 2–5 m. alta; ramulis patentibus, teretibus vel quadrangularibus, subcrassis, internodiis ad 1.5 cm. longis; foliis breviter petiolatis, longe lineari-lanceolatis, gracilibus, distincte falcatis, interdum rectis, 6–11 cm. longis, 6–8 mm. latis, superne gradatim attenuatis, apice calloso-acuminatis, basi attenuatis, margine leviter revolutis, costa supra leviter elevata subtus vix elevata circiter 1.5 mm. lata, striis stomatiferis albidis circiter 1.2 mm. latis, latitudine circiter 2/3 striarum marginalium



aequalibus, striis marginalibus pallidis plus minusve argenteo-viridibus, circiter 2 mm. latis; petiolis crassis 2–3 mm. longis; floribus masculis ignotis; floribus ovulatis (fide Pilger) in axilla bractae ad basim ramuli foliati enatis, breviter crassiuscule pedicellatis, pedicellis apice squamis imbricatis instructis, ovulo solitario; seminibus maturis ignotis.

Western Hupeh and western Szechuan (?), cliffs of ravines, at altitudes of 300–1100 meters, rare.

CHINA: Western China: No precise locality (presumably western Szechuan), *E. H. Wilson 3005* (AA, TYPE). Szechuan: Mt. Omei, *W. K. Wu 9209* (AA, US). Hupeh: Hsing-shan Hsien, *E. H. Wilson 2107* (AA, US).

Only sterile specimens are available. Rehder and Wilson originally indicated *Wilson 3005* as an ovulate specimen, but the available one does not bear any flowers. In Pilger's original description of the genus, the ovulate flower is described on the basis of a single flower from *Wilson 3005*, received through Rehder. In vegetative characters alone, these western Chinese specimens clearly represent a species distinct from those of other regions.

A sterile specimen from Dupha Hills, *J. L. Lister* in 1874 (AA), has long narrow falcate leaves very similar to those of *A. cathayensis*, but with slightly broader stomatal bands, which are as wide as the marginal bands. This specimen may indicate a more western extension of the range of the species.

### 3. *Amentotaxus formosana* sp. nov.

*Podocarpus argotaenia* sensu Henry in Trans. Asiat. Soc. Jap. 24. Suppl: 91. 1896 (List Pl. Formos.); Masters in Jour. Linn. Soc. Bot. 26: 547. 1902, p. p.; Matsum. & Hayata in Jour. Coll. Sci. Tokyo 22: 399. 1906 (Enum. Pl. Formos.); non Hance.

*Cephalotaxus argotaenia* sensu Forbes & Hemsl. in Jour. Linn. Soc. Bot. 26: 547. 1907, p. p., non Pilger.

*Amentotaxus argotaenia* sensu Yamamoto in Bot. Mag. Tokyo 40: 453. 1926, Suppl. Icon. Pl. Formos. 3: 1, t. 1. 1927, op. cit. 5: 7, f. 1–2. 1932, in Jour. Jap. Bot. 8: (64). f. 1–6. 1932; Kanehira in Trans. Nat. Hist. Soc. Formos. 84: 80. 1926, Formos. Trees rev. ed. 33, f. 2. 1936; Kudo in Jour. Soc. Trop. Agr. Formos. 3: 110. 1931; Chen, Ill. Man. Chin. For. Trees & Shrubs 13, f. 2. 1937; non Pilger.

Arbor vel arbuscula vel frutex ad 10 m. altus, sparse ramosus; ramulis oppositis, patentibus, subteretibus vel subquadrangularibus, internodiis 6–12 mm. longis; foliis subsessilibus vel breviter et crasse petiolatis, lanceolatis, leviter sed distincte falcatis, raro rectis, 5–8.5 cm. longis, 7–9.5 mm. latis, superne gradatim attenuatis, apice calloso-acuminatis, basi acutis vel obtusis, margine revolutis, supra atro-viridibus, costa supra subplana subtus leviter elevata circiter 1.5 mm. lata, striis stomatiferis albidis circiter 2 mm. latis, quam striis marginalibus duplo latioribus, striis marginalibus pallide argenteo-viridibus, circiter 1 mm. latis; petiolis nullis vel crassis vix 1 mm. longis; racemis masculis ad

apicem ramulorum plerumque 3- vel 4-fasciculatis, raro 5-fasciculatis vel solitariis, gracilibus, circiter 3 cm. longis, breviter pedunculatis, basi squamis coriaceis 2-4-seriatim imbricato-obtectis, squamis plerumque 7, carinatis, superioribus gradatim majoribus, oblongo-lanceolatis, ad 15 mm. longis et 5 mm. latis, basalibus ovatis ad 5 mm. longis et 3-4 mm. latis, pedunculis circiter 5 mm. longis; floribus masculis subsessilibus, antheris subpeltatis brevistipitatis fasciculatis 1.5 mm. crassis, loculis plerumque 5-8 pendulis circiter 0.7 mm. longis et 0.5 mm. latis, filamentis brevibus vix 1 mm. longis; floribus ovulatis solitariis lateralibus, subglobosis, circiter 3 mm. crassis, longe pedicellatis, basi squamis circiter 10 minutis opposite imbricato-obtectis, squamis 5-seriatis, carinatis, subaequalibus, circiter 3.5 mm. longis vel latis; ovulo 2 mm. longo et 1.5 mm. crasso, disco parvo cupuliformi carnosio, 2.5 mm. diametro et 1.5 mm. longo; semine maturo solitario axillari, longe pedicellato, oblongo-ellipsoideo, 20-25 mm. longo, 9-11 mm. crasso, apice mucronulato-rostrato, basi squamis minutis persistentibus imbricatis instructo, arillo rubro-luteo, demum atro-purpureo; pedicello gracili, 1.5-2 cm. longo.

Southern Formosa (Taiwan), in broad-leaved forests in shady places, near ravines and cliffs, at altitudes of 700-1300 meters, rather scarce.

CHINA: Taiwan: Taito, Daibu, Taririku, *R. Kanehira*, May 11, 1924 (AA), *R. Kanehira & S. Sasaki*, Feb. 19, 1925 (AA), *S. Sasaki*, Feb. 25, 1925 (NTU, TYPE), *R. Kanehira*, Dec. 27, 1925 (AA); Southern Koshun, *R. Kanehira* in 1924 (AA).

The Formosan plant is better known than plants from the mainland, although it is also more or less rare. It has been described in detail by Yamamoto and others and illustrated by numerous photographs and drawings. The source of the figure given by Chen is not indicated, but it is an exact copy of Kanehira's figure. Chen's generic description also fits only the Formosan plant.

#### 4. *Amentotaxus yunnanensis* sp. nov.

*Amentotaxus argotaenia* sensu Hu in Bull. Chin. Bot. Soc. 1(1): 8. 1935, non Pilger.

Arbuscula, ramis crassis, ramulis oppositis, erecto-adscendentibus, gracilibus, teretibus vel subquadrangularibus, internodiis ad 1.3 cm. longis; foliis subsessilibus, linearibus, rectis, raro apicem versus leviter falcatis, 3-7 cm. longis, 8-11 mm. latis, apice obtusis vel acuminatis, basi late acutis vel subrotundatis, margine leviter revolutis, supra viridibus vel pallide viridibus, costa supra prominula elevata subtus subplana vix elevata circiter 1.5 mm. lata, striis stomatiferis leviter fuscis vel luteo-albidis circiter 2.5 mm. latis, quam striis marginalibus 2.5-3-plo latioribus, striis marginalibus pallide argenteo-viridibus ad 1 mm. latis; floribus masculis ovulatisque ignotis; semine maturo pedicellato, ovoideo, circiter 2.2 cm. longo et 1.5 cm. crasso, apice leviter rostrato, arillo rubro-luteo, basi squamis coriaceis 3-seriatim imbricatis instructo, squamis oppositis, circiter 12, distincte carinatis, superioribus gradatim majoribus ad 4 mm. longis et

5 mm. latis, basalibus ovatis ad 2 mm. longis et latis; pedicello crasso, circiter 1.4 mm. longo, in sicco plano.

Southern Yunnan, a moss-clad plant on rocky hill at an altitude of 1600 meters.

CHINA: Yunnan: Makwan, *H. T. Tsai* 51887, March 2, 1932 (US, TYPE).

Merrill (in Jour. Arnold Arb. 19: 21. 1938) records *Amentotaxus argotaenia* from Chapa, Tonkin, basing the record on *Pételot* 3897. I have not seen specimens of this collection, but judging from the location the plant is probably referable to the Yunnan species, although it may possibly represent *A. argotaenia*, definitely known only from Kwangtung and Hongkong.

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